TIMBER MANAGEMENT PLAN

ROOSEVELT WORKING CIRCLE
July 1, 1962 - June 30, 1972
Roosevelt National Forest
Colorado
R-2

Submitted By:

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Reviewed and Recommended for Approval:

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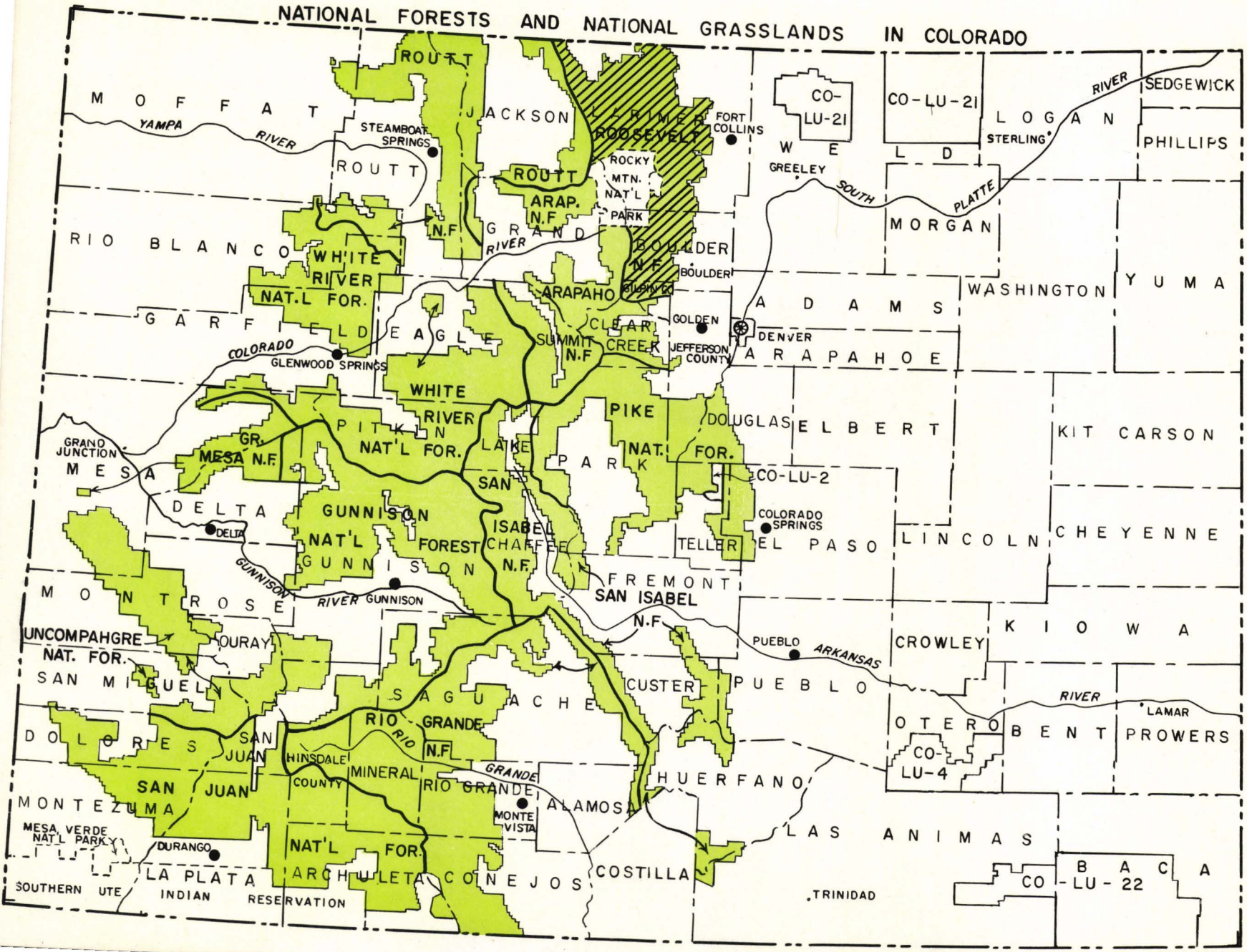
NATIONAL FORESTS AND NATIONAL GRASSLANDS IN COLORADO
ROOSEVELT NATIONAL FOREST and WORKING CIRCLE
ROUTT
JACKSON
LARIMER
ROOSEVELT
MOFFAT
YAMPA RIVER
STEAMBOAT SPRINGS
FORT COLLINS
CO-LU-21
CO-LU-21
LOGAN
SEDGEWICK
PHILLIPS
STERLING
RIVER
GREELEY
SOUTH PLATTE
ROUTT
ROCKY MTN. NAT'L PARK
ARAP. N.F.
N.F
GRAND RIVER
BOULDER N.F
BOULDER
MORGAN
RIO BLANCO
WHITE RIVER NAT.L FOR.
ARAPAHO
WASHINGTON
YUMA
ADAMS
GARFIELD
EAGLE
CLEAR CREEK
GOLDEN
DENVER
JEFFERSON COUNTY
ARAPAHOE
COLORADO
GLENWOOD SPRINGS
SUMMIT
N.F
WHITE RIVER
PIKE
DOUGLAS
ELBERT
KIT CARSON
GRAND JUNCTION
PITKIN
NAT'L FOR.
LAKE
PARK
NAT. FOR.
GR. MESA N.F.
MESA
SAN
CO-LU-2
DELTA
GUNNISON NAT'L FOREST
ISABEL
CHAFFEE
N.F.
COLORADO SPRINGS
TELLER
EL PASO
LINCOLN
CHEYENNE
GUNNISON
GUNNISON
RIVER
FREMONT
SAN ISABEL
N.F
MONTROSE
UNCOMPAHGRE NAT. FOR.
OURAY
PUEBLO
ARKANSAS
CROWLEY
KIOWA
SAN MIGUEL
CUSTER
PUEBLO
SAGUACHE
RIO GRANDE
RIVER
LAMAR
OTERO
BENT
PROWERS
DOLORES
SAN JUAN
HINSDALE
RIO GRANDE N.F.
CO-LU-4
SAN JUAN
MINERAL
COUNTY
RIO GRANDE
HUERFANO
MONTEZUMA
ALAMOSA
MONTE VISTA
MESA VERDE NAT'L PARK
DURANGO
LAS ANIMAS
NAT'L FOR.
LA PLATA
ARCHULETA
CONEJOS
COSTILLA
BACA
CO-LU-22
SOUTHERN UTE INDIAN RESERVATION
TRINIDAD
GPO 850806

CONTENTS

	Page
Summary of Plan	1
Table 1 - Annual Allowable Cut from Regulated Area	1
Volume by Species from Regulated Area.	1
Table 2 - Total Volume in Unregulated Types.	2
Table 3 - Area Summary by Ownership, Land Classification, and Stand Size Class.	2
Table 4 - Area by Forest Cover Type and Stand Size Class for State and Private Commercial Forest Lands	3
Table 5 - Total Volume for Commercial Forest Land by Ownership	3
Table 6 - Area by Types, Stand Size and Stocking Class	4
Table 7 - Summary of Total Area, Net Operable Area, Net Volume Per Acre and Total Volume By Species for Major Sawtimber Types - National Forest Unreserved Lands.	5
Table 8 - Summary of Total Area, Net Operable Area, Net Volume Per Acre and Total Volume By Species for Major Poletimber Types - National Forest Unreserved Lands.	6
Table 9 - Summary of Annual Growth and Mortality for Sawtimber Types	7
Table 10 - Periodic Annual Net Growth Based on Past 10 Years for Trees 5.0" D.B.H. and larger	8
Table 11 - Recommended Rotation and Adjustment Period.	8
Revision Date.	8
Introduction.	9
Summary of Results Under Previous Plans	10
Allowable Cut vs. Actual Cut	10
Timber Stand Improvement and Reforestation	10
Protection	11
Other Accomplishments.	11
Management Objectives	12
Multiple-Use Coordination	13
Regulation.	14
Rotation	14
Methods of Cutting	15
Growing Stock.	15
Table 12 - Lodgepole Pine Poletimber Type - Areas to be Thinned and Clear Cut by Crown Density Classes.	16
Table 13 - Showing Area by Stand Size Classes and Adjusted Area for Growing Stock for Regulated Types	17
Growth and Mortality	17
Calculation of Allowable Cut	18
Lodgepole Pine Sawtimber Type	18
Spruce-Fir Sawtimber Type	20
Ponderosa Pine-Douglas-fir Working Group.	22
Lodgepole Pine Poletimber Type.	23

CONTENTS (Continued)

	Page
Allowable Cut Beyond the 40-Year Adjustment Period.	25
Table 14 - Allowable Cut - Area and Volume by 10-Year Periods Based on Present Rate of Growth.	26
Cutting Budget.	27
Table 15 - Cutting Budget - F.Y. 1962-1971	28-29
Transportation.	30
Right-of-Way Needs	30
Table 16 - Timber Access Road Development Program F.Y. 1962-1971 Combination Forest Service-Purchase Construction. . .	32-33
Sales Policy.	34
Points of Manufacture.	34
Merchantability Specifications	34
Logging Methods.	34
Stand Improvement	36
Reforestation Survey	36
Planting	36
Measures to Aid or Control Natural Regeneration.	36
Thinning	36
Table 17 - The Planting Job -F.Y. 1962 to 1971; F.Y. 1962 to 1980	38-39
Protection.	40
Insects.	40
Disease.	41
Animals.	42
Fire	42
Acquisition	43
Supporting Data	44
Compartment Records.	44
Timber Inventory	44
Sampling Error	45
Data Processing.	45
Method for Calculating Periodic Annual Net Growth.	46
Table 18 - Relation Between Site Tree Age Classes and Size Classes .	47-48
Table 19 - Annual Growth and Mortality Per Acre by Major Sawtimber Types.	49-50
Table 20 - Annual Growth and Mortality Per Acre By Major Poletimber Types.	51
Table 21 - Annual Growth and Mortality Per Acre By Stand Size Classes and Species.	52
Average Net Volume Per Acre By Species and Crown Density Classes:. .	
Table 22 - Douglas-fir Sawtimber Type	53
Table 24 - Douglas-fir Poletimber Type.	55
Table 26 - Ponderosa Pine Sawtimber Type.	57
Table 28 - Ponderosa Pine Poletimber Type	59
Table 30 - Lodgepole Pine Sawtimber Type.	61
Table 32 - Lodgepole Pine Poletimber Type	63
Table 34 - Spruce-Fir Sawtimber Type.	65

CONTENTS (Continued)

Page

Average Net Volume Per Acre By Species and Crown Density Classes:. .
Table 36 - Spruce-Fir Poletimber Type 67

Stock and Stand Tables:
Table 23 - Douglas-fir Sawtimber Type 54
Table 25 - Douglas-fir Poletimber Type. 56
Table 27 - Ponderosa Pine Sawtimber Type. 58
Table 29 - Ponderosa Pine Poletimber Type 60
Table 31 - Lodgepole Pine Sawtimber Type. 62
Table 33 - Lodgepole Pine Poletimber Type 64
Table 35 - Spruce-Fir Sawtimber Type. 66
Table 37 - Spruce-Fir Poletimber Type 68

Table 38 - Area, Volume Per Acre, and Total Volume by Volume Stratum For Unreserved National Forest Lands. 69-70
Table 39 - Area, Volume Per Acre and Total Volume by Volume Stratum and Ownership 71-72

Compartment Map 73

SUMMARY OF PLAN

Table 1

Annual Allowable Cut from Regulated Area

Type	Area Acres	Volume Scribner Dec. C. M B.F.	Volume Int. ¼-Inch M B.F.	Volume Cubic * Feet M C.F.
Sawtimber				
Ponderosa Pine--Douglas Fir	630	1,300	1,600	500
Lodgepole Pine	1,590	12,700	15,700	4,400
Spruce Fir	1,130	14,300	16,200	3,600
Total Sawtimber	3,350	28,300	33,500	8,500
Poletimber				
Lodgepole Pine	3,166	--	--	2,900
Grand Total	6,516	28,300	33,500	11,400

*Note: Amounts shown for sawtimber were converted from Scribner Dec. C. by use of factors developed from stand tables.

Volume by Species from Regulated Area

Species	Sawtimber Types * Ponderosa Pine Douglas Fir M B.F.	Lodgepole Pine M B.F.	Spruce Fir M B.F.	Total M B.F.	Poletimber Type Lodgepole Pine M C.F.
Douglas Fir	536			536	58
Ponderosa Pine	655			655	
Lodgepole Pine	35	9,906	1,573	11,514	2,639
Limber Pine	23			23	
Subalpine Fir	22	635	2,288	2,945	116
Engelmann Spruce	29	2,159	10,439	12,627	58
Aspen	-	-	-	-	29
Total	1,300	12,700	14,300	28,300	2,900

*Board foot volume based on Scribner Dec. C. Log Rule.

Table 2

Total Volume in Unregulated Types

Type	Area (Acres)	Volume
Aspen Poletimber	8,732	5,607 M C.F.
Residual Volume on Lodgepole Pine Sawtimber Cutover Areas (Trees 5.0" to 8.9")	1,590 (Acres Per Year)	1,273 M C.F. (Per Year)

Table 3

Area Summary by Ownership, Land Classification, and Stand Size Class

Land Classification	National Forest	State and County	Private	Total
	Commercial Forest Land - Unreserved			
	(acres)	(acres)	(acres)	(acres)
Large Sawtimber	550	40	50	640
Small Sawtimber	203,868	3,469	45,816	253,153
Poletimber	317,772	4,082	114,755	436,609
Seedling-Sapling	11,556	300	2,268	14,124
Nonstocked	2,648	88	1,733	4,469
Sub-Total	536,394	7,979	164,622	708,995
Reserved	26,525	419		26,944
Noncommercial	152,690	2,601	59,974	215,265
Nonforest	70,752	7,521	51,063	129,336
Grand Total	786,361	18,520	275,659	1,080,540

Table 4

Area by Forest Cover Type and Stand Size Class
For State and Private Commercial Forest Lands

Type	Owner-ship	Saw-timber Acres	Pole-timber Acres	Seedling-Sapling Acres	Non-stocked Acres	Total State Acres	Total Private Acres
Douglas-fir	State	145	120			265	
	Private	2,293	7,489		10		9,792
Ponderosa Pine	State	1,144	1,019		50	2,213	
	Private	28,515	51,772	25	1,293		81,605
Lodgepole Pine	State	840	1,995	200	5	3,040	
	Private	10,943	49,906	1,753	380		62,982
Limber Pine	State	70	265	70		405	
	Private	45	1,435	120			1,600
Spruce-Fir	State	1,350	522		43	1,915	
	Private	4,070	1,462		30		5,562
Aspen	State		385	30		415	
	Private		2,691	370	20		3,081
Total		49,415	119,061	2,568	1,831	8,253	164,622

Total Acres State and Private = 172,875 Acres

Table 5

Total Volume For Commercial Forest Land By Ownership

Ownership	Total Volume: Board Feet - Trees 9.0" D.B.H. and larger: International $\frac{1}{4}$" MM B.F.	Total Volume: Board Feet - Trees 9.0" D.B.H. and larger: Scribner Dec. C MM B.F.	Total Volume: Cubic Feet Trees 5.0" D.B.H. & Larger: MM C.F.
Softwood Types			
National Forest	1,910	1,610	799
State	37	32	12
Private	211	174	152
Total	2,158	1,816	963

Table 6

Area By Types, Stand Size and Stocking Class

Unreserved Commercial National Forest Land

Timber Types	Large Sawtimber			Small Sawtimber				Poletimber				Seedling-Sapling				Non-stocked	Total
	Med.	Poor	Total	Well	Med.	Poor	Total	Well	Med.	Poor	Total	Well	Med.	Poor	Total		
Douglas-fir		120	120	30	2,028	5,092	7,150	9,372	5,226	345	14,943	45			45	110	22,368
Ponderosa Pine					8,148	35,174	43,322	4,470	31,336	23,384	59,190			90	90	1,398	104,000
Lodgepole Pine				340	43,437	45,696	89,473	123,701	83,213	10,262	217,176	5,224	3,031	881	9,136	682	316,467
Limber Pine					355	690	1,045	180	3,760	2,570	6,510		220	190	410		7,965
Spruce-Fir	430		430	2,145	45,771	14,962	62,878	1,575	6,833	2,813	11,221		70	20	90	458	75,077
Aspen											8,732				1,785		10,517
Total	430	120	550	2,515	99,739	101,614	203,868	139,298	130,368	39,374	317,772	5,269	3,321	1,181	11,556	2,648	536,394

Table 7

Summary of Total Area, Net Operable Area, Net Volume Per Acre and Total Volume By Species
For Major Sawtimber Types--National Forest Unreserved Lands

Scribner Dec. C Log Rule*--Trees 9.0 Inches D.B.H. and Larger

Type	Gross Area	Volume Per Acre Bd. Ft.	Net Operable Area	Species							Percent
				Douglas-fir	Ponderosa Pine	Lodgepole Pine	Limber Pine	Subalpine Fir	Engelmann Spruce	Total	
				Volume MM B.F. (Based on Gross Area)							
Douglas-fir	7,270	2,608.32	3,635	11	6	1			1	19	1.18
Ponderosa Pine	43,322	1,937.05	21,661	14	66	2	1	1		84	5.21
Lodgepole Pine	89,473	7,910.58	62,631	2	-	550	2	37	117	708	43.95
Spruce-Fir	63,308	12,633.97	44,316	2	-	83	-	127	588	800	49.66
Total	203,373	-	132,243	29	72	636	3	165	706	1,611	100.00
Percent	-	-	-	2	5	39	-	10	44	100	100.00

*Note: To convert Dec. C Log Rule to International $\frac{1}{4}$-Inch multiply by 1.18.
To convert Dec. C Log Rule to Cubic Feet multiply by 0.302.

Table 8

Summary of Total Area, Net Operable Area, Net Volume per Acre and
Total Volume By Species For Major Poletimber Types
National Forest Unreserved Lands - Volume in Cubic Feet

Trees 5.0 Inches D.B.H. and Larger

Type	Gross Area	Volume Per Acre Cu.Ft.	Net Operable Area	Species								
				Douglas fir	Ponderosa Pine	Lodgepole Pine	Limber Pine	Sub-alpine Fir	Engelmann Spruce	Blue Spruce	Aspen	Total	Percent
				Volume MM C.F. (Based on Gross Area)									
Douglas-fir	14,943	706.71	10,460	6,002	2,002	1,342	77		277	860		10,560	3.37
Ponderosa Pine	59,190	485.68	29,595	5,408	21,319	1,831				190		28,748	9.17
Lodgepole Pine	217,176	1,191.99	152,023	5,036	734	234,394	743	9,760	5,423		2,782	258,872	82.56
Spruce-Fir	11,221	1,368.92	7,855			1,313	1,596	5,599	6,852			15,360	4.90
Total	287,587		199,933	16,446	24,055	238,880	2,416	15,359	12,552	1,050	2,782	313,540	100.00

Table 9

Summary of Annual Growth and Mortality
For Sawtimber Types
Based on Past Ten Years

Types	Area in Acres	Bd.Ft. in Trees 11.0"D.B.H.and Larger					Cubic Feet in Trees 5.0"D.B.H. and Larger				
		Per Acre			Total Annual Net Growth	Total Annual Mortality	Per Acre			Total Annual Net Growth	Total Annual Mortality
		Gross Growth	Mortality	Net Growth			Gross Growth	Mortality	Net Growth		
		BF	BF	BF	MBF	MBF	CF	CF	CF	MCF	MCF
Douglas-fir	7,270	7.39	2.66	4.73	34	19	2.72	1.05	1.67	12	8
Ponderosa Pine	43,322	9.84	1.93	7.91	343	84	3.16	0.62	2.54	110	27
Lodgepole Pine	89,473	22.11	10.45	11.66	1,043	935	8.23	3.56	4.67	418	319
Spruce-Fir	63,308	23.00	8.97	14.03	888	568	6.66	3.05	3.61	229	193
Total	203,373	62.34	24.01	38.33	2,308	1,606	20.77	8.28	12.49	769	547

Table10

Periodic Annual Net Growth Based on Past 10 Years
For Trees 5.0" D.B.H. and Larger

Type	Cubic Feet Per Acre	Total for Type (MCF)
Ponderosa Pine	2.54	110
Lodgepole Pine		
Sawtimber	4.67	418
Poletimber	16.01	3,477
Spruce-Fir		
Sawtimber	3.61	229

Table 11

Recommended Rotation and Adjustment Period

Type	Adjustment Period (Years)	Rotation (Years)
Lodgepole Pine	40	120
Spruce-Fir	40	140
Ponderosa Pine-Douglas-fir Working Group	40	140

REVISION DATE: June 30, 1971.

TIMBER MANAGEMENT PLAN

ROOSEVELT WORKING CIRCLE

ROOSEVELT NATIONAL FOREST

INTRODUCTION

This timber management plan for the Roosevelt Working Circle sets forth a 10-year program of the action necessary in this period to meet the long-term objectives contained in the General Timber Management Statement for the Roosevelt National Forest.

This plan will be revised June 30, 1971. Earlier revision may be necessary to meet changing conditions.

Detailed Forest Survey Data, from which this plan was formulated, are found on the IBM sheets labeled "1958, Forest Survey, Colorado, IBM Sheets, Roosevelt National Forest, Sample Unit 24," and filed in the office of the forest supervisor, Fort Collins, Colorado.

Atlas binders containing compartment descriptions and maps including area and volume breakdown by types, are kept in the rangers' offices. These records will be kept current for action taken within the compartments.

SUMMARY OF RESULTS UNDER PREVIOUS PLANS

Allowable vs. Actual Cut

Prior to 1949 the annual allowable cut on the Roosevelt National Forest was 34,808 M B.F. It was reduced to 21,000 M B.F. for the period 1949-1959 and has remained at that amount to the present time.

The three working circles in existence at the start of the period were combined into one in 1958.

The volume of timber actually harvested in the last five years is shown in the table below.

Volume Harvested -- July 1, 1956 to June 30, 1961

Fiscal Year	Sawtimber (M B.F.)	Convertible Products (M B.F.)	Total (M B.F.)
1957	8,964	1,009	9,973
1958	8,517	1,239	9,756
1959	7,624	973	8,597
1960	6,172	1,199	7,371
1961	4,539	1,069	5,608
Total	35,816	5,489	41,305
Average	7,163	1,098	8,261

The estimated current capacity of the lumber-producing industries in and adjacent to the Roosevelt National Forest is 16,000 M B.F. The shortage in industry capacity, together with the low actual cut, indicates that new industry is needed and that other than local markets must be utilized. Also, this must be accompanied by a more aggressive timber sales program and a stepped-up road construction program.

Timber Stand Improvement and Reforestation

During the period 1951 to 1960, thinning was accomplished on 402 acres and pruning on 226 acres. In the same period, 102 acres were planted to ponderosa pine, lodgepole pine and Douglas-fir and 54 acres were seeded to lodgepole and ponderosa pine.

Protection

Dwarfmistletoe control work was done on 829 acres of lodgepole pine type during the period 1951 to 1960.

Insect epidemics have been principally in the ponderosa pine type, with about 14,000 trees treated to control the Black Hills beetle in the 10-year period. A small outbreak of Engelmann spruce bark beetles necessitated treatment of 159 Engelmann spruce trees in 1960.

Other Accomplishments

Prescribed burning has been used as a tool to kill overstory and understory trees heavily infected with dwarfmistletoe and to reduce fire hazard on 520 acres of cut-over area. Sale area betterment and slash disposal funds were used to accomplish these project jobs. Location, date and area were as follows:

District	Location	Acres	Date Burned
Laramie River	Roach Area	63	10/22/58
Laramie River	Roach Area	49	6/9/59
Redfeather	Swamp Creek Area	25	10/27/59
Redfeather	Pearl Creek Area	12	12/59
Laramie River	Roach Area	340	5/24/60
Redfeather	Swamp Creek Area	40	10/25/60

MANAGEMENT OBJECTIVES

The ultimate objective contained in the General Timber Management Statement for the Roosevelt National Forest, namely that of attaining the forest's sustained yield capacity, can be reached only by creating optimum growing conditions on all commercial timber areas within the working circle and by protecting these areas from destructive factors such as fire, disease and insects.

This working circle plan prescribes what must be done in the 10-year period, July 1, 1962 to June 30, 1972, to meet the long-term objective and to put the commercial forest land area into good growing condition by the year 2000 A.D.

The action outlined below is based on the fact that the existing manufacturing capacity is insufficient to harvest the allowable cut of timber.

1. Attain the allowable cut of sawtimber by F.Y. 1965. This will require establishing additional sawmill capacity. Such action will be encouraged by offering sales of sawtimber in sufficient volume to attract new industry.

2. Attain the allowable cut of poletimber 5 years after a pulpwood or particle-board operation utilizing small round material is established. Encourage such an operation by publishing a brochure describing the resource and by advertising a "package" if interest is expressed.

3. Assure adequate stocking within 3 years after cutting on all current timber sale areas by applying approved methods of ground preparation. Plant approximately 300 trees per acre on some 1,000 acres of spruce-fir cutover area per year to assure regeneration of the stand.

4. Make an on-the-ground examination by F.Y. 1964 of the 2,648 acres classed as nonstocked commercial forest land and the 1,151 acres classed as poorly-stocked seedling-sapling type. Pending the completion of this examination, program the job of doing the necessary reforestation on 50 percent of the area.

5. Put lodgepole pine cutover areas into optimum growing condition by thinning overstocked regeneration. This will be done on 5,500 acres through the use of Knutson-Vandenburg Act funds. On older cut-over areas, and on burns, appropriated funds will be needed to thin 5,270 acres of overstocked seedling-sapling stands. The current, small round wood market will enable commercial thinning on an additional 2,000 acres during the planning period.

6. Control dwarfmistletoe on lodgepole and ponderosa pine cut-over areas. Approximately 5,000 acres of lodgepole pine residual stands of less than five cords per acre and 1,000 acres of ponderosa pine type will be treated, using Knutson-Vandenburg Funds. On older lodgepole pine cut-over areas, appropriated funds will be needed for dwarfmistletoe control on 2,000 acres.

7. Prevent epidemic outbreaks of destructive forest insects by effective detection, by use of timber sale contract clauses requiring preventive action and by control work done annually on a maintenance basis.

8. Keep commercial forest land fire damage within the annual PAR established in the presuppression plan for the forest.

MULTIPLE-USE COORDINATION

Timber management activities within the travel and water influence zones and occupancy zones will be in accordance with the Eastern Colorado Subregion Land Management Plan.

The ranger district land management plans will be consulted for details at the time that presale prescriptions are prepared. Also, reference will be made to FSM-FSH 2100 and 2300 and to the Timber Management Guides, FSH2-2442.8.

The principal considerations for this planning period are:

1. Post logging roads, where heavy use by others is anticipated, with signs warning of log-truck traffic hazard.

2. Locate logging roads to avoid open grassland areas where practicable.

3. Limit timber cutting in travel and water influence and occupancy zones in accordance with FSH 2413 and the Timber Management Guides.

4. Inform the general public of new or changed applications of silviculture, logging, slash disposal or insect control and of the part timber management plays in the multiple use of the forest's resources.

5. Timber harvest in the Little South Fork of the Poudre will be coordinated with watershed management plans for that drainage and with watershed studies being conducted by Colorado State University.

REGULATION

Regulation will be by area, with the allowable cut expressed in both area and volume. Control will be by 10-year periods. Undercuts that have built up during the period may be cut during the remainder of the same period, provided that the total cumulative cut does not exceed the allowable periodic cut by more than 10 percent.

The control of the allowable cut will be by type area and not by species or products cut within the type. Sales programs will be by species and products and will be in volumes sufficient to meet area control objectives. Sales programs will normally exceed allowable cut objectives; otherwise the average annual cut will fall short of meeting the 10 year objective. Emphasis will be placed on increasing the current actual cut until experience shows the allowable cut objectives are assured.

The financed cut for any one year is based upon volume and includes the cut from both the regulated and unregulated areas. The financial cut quota should be sufficient to meet both volume and area objectives for the forest as a whole.

If the present relationship between area and volume is found to be out of proportion for the forest as a whole, the volume allowable cut will be adjusted to be consistent with area regulation. No adjustment, however, will be made prior to the end of the first 5-year period.

Rotation

Since a 40-year adjustment period is used to convert wild stands to managed stands, rotation is important at this time only for use in the Kemp formula to obtain a comparison with the allowable cut as determined by the tabulation method. Better information is needed to establish the length of the rotation and this will be collected during the next 10 years.

For the purpose of using the Kemp formula as a comparison with the tabulation method of determining the allowable cut, the following rotations are used:

Lodgepole pine type	120 Years
Spruce-Fir type	140 Years
Ponderosa pine - Douglas-fir working group	140 Years

For the lodgepole pine and spruce-fir types the period includes 5 years for regeneration after logging.

Methods of Cutting

Region Two's Management Guide for Lodgepole Pine, Engelmann Spruce and Ponderosa Pine, FSH2-2442.8 will be applied in timber marking. This guide provides for clear cutting by patches or blocks, with even-age management as the objective for the lodgepole pine, spruce-fir, Douglas-fir and ponderosa pine timber types.

Growing Stock

The forest inventory divides the major timber types into stand size classes and stocking classes. The Forest Survey standard definitions are as follows:

Sawtimber	Trees	11.0 inches d.b.h. and larger
Poletimber		5.0 inches d.b.h. to 10.9 inches d.b.h.
Seedling-Sapling		½ foot high to 4.9 inches d.b.h.

The terms "stocking classes" or "crown density classes" refer to the extent to which growing space is utilized by present growing stock trees of commercial species. The classification is based on the percent of crown closure. The crown density classes for sawtimber stands, as used in this plan, are for the percent of closure of sawtimber crown. The stocking classes for poletimber and seedling-sapling stands are based on crown closure for all trees regardless of their size.

Classification	Percent of Crown Closure
Well stocked	70+
Medium stocked	40 to 69
Poorly stocked	10 to 39
Nonstocked	0 to 9

Condition classes were not used in the survey. The breakdown into stand size classes is purely on size and does not reflect the growing potential of the trees into the next larger size class. For example, some areas of stagnated lodgepole pine were typed as poletimber. Considering the age and overstocking, some of these stands are not likely to grow into sawtimber-size stands. Such lands can be put into production only by removing the present stand and regenerating the area.

Because of the above-described situation, it was necessary to adjust Forest Survey's area of lodgepole pine poletimber type so that it would include only those stands having a chance of growing into sawtimber. This adjustment was based on an estimate of the acreage of lodgepole pine poletimber type that should be thinned or clear cut. Age, stocking and the prevalence of dwarfmistletoe were the influential factors.

Stagnated poletimber stands over 70 years old cannot be expected to grow into sawtimber, hence they will be clear cut rather than thinned. Clear cutting will also be done in poletimber stands heavily infected with dwarfmistletoe.

Of the 217,176 acres of lodgepole pine poletimber type, it was estimated that 121,901 acres would likely grow into sawtimber and 95,275 acres should be reclassified as nonstocked as far as growing stock is concerned. The acres and percentage by stocking classes are shown in Table 12.

Table 12

Lodgepole Pine Poletimber Type

Areas to be Thinned and Clear Cut
by Crown Density Classes

Crown Density Classes	Area to be Thinned		Area to be Clear Cut		Total Acres
	Acres	Percent	Acres	Percent	
Well	92,776	75	30,925	25	123,701
Medium	29,125	35	54,088	65	83,213
Poor	0	0	10,262	100	10,262
Total	121,901		95,275		217,176
Percent of Total		56		44	

No adjustment to reflect growing stock is necessary in the Forest Survey's area of spruce-fir, Douglas-fir and ponderosa pine poletimber types.

TABLE 13

Showing Area by Stand Size Classes and Adjusted Area for Growing Stock for Regulated Types

	Lodgepole Pine Type				Spruce-Fir Type		Ponderosa Pine Type		Douglas-fir Type	
	Forest Survey Area		Area Adjusted To Reflect Growing Stock		Forest Survey Area		Forest Survey Area		Forest Survey Area	
	Acres	%	Acres	%	Acres	%	Acres	%	Acres	%
Sawtimber	89,473	28	89,473	28	63,308	84	43,322	42	7,270	32
Poletimber	217,176	69	121,901	39	11,221	15	59,190	57	14,943	67
Seedling-Sapling	9,136	3	9,136	3	90	0	90	0	45	0
Nonstocked	682	0	95,957	30	458	1	1,398	1	110	1
Total	316,467	100	316,467	100	75,077	100	104,000	100	22,368	100

Table 13 summarizes the area of stand size classes for the lodgepole pine, spruce-fir, ponderosa pine and Douglas-fir types. This table indicates a present shortage of area in the seedling-sapling size and an over-abundance of area in the nonstocked class for a desirable distribution of stand size classes for lodgepole pine.

At the end of 40 years, and with the cut proceeding according to plan, all the lodgepole pine type will be less than 120 years of age and an improved distribution of age classes will have been obtained.

In the spruce-fir type, an uneven distribution of age-classes will occur in the next cutting period because of the high percentage in the sawtimber size class and the low percentage in the poletimber class.

There is a decided lack of seedling-sapling size in the Engelmann spruce, ponderosa pine and Douglas-fir types. This lack is most serious in the ponderosa pine type, and methods to obtain proper regeneration will be applied.

Growth and Mortality

Growth and mortality are based on Forest Survey data. The calculation is explained under "Supporting Data". Growth and mortality for the sawtimber types are shown in Table 9. The total annual net growth for all sawtimber types, based on the past 10 years, is 38.33 board feet per acre and the mortality is 24.01 board feet per acre.

The total growth and mortality for the entire sawtimber type is:

Annual gross growth	3,914 M B.F.
Annual mortality	1,606 M B.F.
Annual net growth	2,308 M B.F.

Although empirical yield tables are not available, a potential growth of from 100 to 200 board feet per acre can be expected after the stands have been put under management.

Mortality in general is due largely to disease since most of the sawtimber stands are past their pathological rotation age. Losses from insects have been comparatively light, including those from Engelmann spruce bark beetle. Insect losses have been heavier in the ponderosa pine type than in the other sawtimber types.

Prior to the end of this 10-year planning period, the growth and mortality will be re-examined. If there are any substantial changes, the adjustment period will be revised accordingly.

Calculation of Allowable Cut

Lodgepole Pine Sawtimber Type

There are 89,473 acres of lodgepole pine sawtimber type within the working circle, 70 percent, or 62,631 acres of which are considered operable. Most of this timber is overaged. The current periodic annual net growth per acre is 11.66 board feet in trees 11.0 inches d.b.h. and larger and 4.67 cubic feet in trees 5.0 inches d.b.h. and larger. The average annual mortality per acre is 10.45 board feet in trees 11.0 inches d.b.h. and larger and 3.56 cubic feet in trees 5.0 inches d.b.h. and larger. Considering the general age of the type, the annual net growth can be expected to decrease. A 40-year adjustment period will be used to convert the wild stands to managed stands. This will put the area in good growing condition by the year 2000 A.D. Inoperable area, for the type as a whole, is estimated to be 30 percent. The allowable cut has been discounted to take this into consideration.

The allowable cut in area and volume is shown in Table 14 for each 10-year period. An equal volume of timber to be cut was set up for each 10-year period, and the area was then adjusted to reflect this volume.

The annual allowable cut for the lodgepole pine sawtimber type for this 10-year planning period, based on the tabulation method is as follows:

Area	1,590 acres
Volume	12,700 M B.F., Scribner Dec. C. Log Rule

This compares favorably with other methods of area calculation as follows:

a. Kemp formula:

$$\frac{(89{,}473 \times 7) + (121{,}901 \times 5) + (9{,}136 \times 3) + 95{,}957}{4 \times 120} = \frac{1{,}359{,}181}{480}$$

= 2.832 gross acres/year

1,982 net operable acres x 7,968.88 bd. ft./acre = 15,794 M B.F. per year

b. Straight area calculation based on rotation of 120 years:

$$\frac{316{,}467 \text{ acres}}{120 \text{ years}} = 2{,}637 \text{ gross acres/year}$$

1,846 net acres per year x 7,968.88 bd. ft./acre = 14,710 M B.F. per year

c. Straight area calculation based on harvesting the sawtimber in a 40-year adjustment period:

$$\frac{89{,}473 \text{ acres}}{40 \text{ years}} = 2{,}237 \text{ gross acres/year}$$

1,566 net acres per year x 7,968.88 bd. ft./acre = 12,479 M B.F. per year

The volume to be cut from the 1,590 acres of the lodgepole pine sawtimber type is obtained by applying the average volume per acre as shown in Stock and Stand Table 31 and adding net growth calculated at the midpoint for the 10-year period. The following shows the volume to be cut broken down by species within the type. This is based on Scribner Dec. C Log Rule and is for trees 9.0 inches d.b.h. and larger in the sawtimber type.

Species	Percent of Volume	Volume M B.F.
Lodgepole pine	78	9,910
Engelmann spruce	17	2,160
Subalpine fir	5	630
Total	100	12,700

In addition to the preceding volume, the stock and stand table shows a volume of 800.45 cubic feet per acre in trees 5.0 inches to 8.9 inches d.b.h. This volume is considered unmerchantable for sawtimber, but would be available for small round wood products including pulpwood. This is referred to as the residual stand after clear cutting for sawtimber.

The total volume available for cutting per year would be:

1,590 acres x 800.45 c.f. = 1,273 M C.F.

Spruce-fir Sawtimber Type

There are 63,308 acres of spruce-fir sawtimber type within the working circle. Seventy percent or 44,316 acres, is considered operable at this time. The current periodic annual net growth for trees 11.0 inches d.b.h. and larger is 14.03 board feet per acre and the annual mortality is 8.97 board feet per acre. The annual net growth for trees 5.0 inches d.b.h. and larger is 3.61 cubic feet per acre and the mortality is 3.05 cubic feet per acre. Expanding these figures for the total type gives an annual net growth of 888 M B.F. and an annual mortality of 568 M B.F. for trees 11.0 inches d.b.h. and larger, and an annual net growth of 229 cubic feet and an annual mortality of 193 cubic feet for trees 5.0 inches d.b.h. and larger. Most of the timber is over-aged. The overall objectives call for putting the area into good growing condition by the year 2000 A.D. This will mean harvesting the overmature timber during the next 40 years, hence a 40-year adjustment period will be used to determine the allowable cut.

The mortality and growth will be re-examined prior to the end of this 10-year period. If a material change is found in the annual net growth the adjustment period may be changed accordingly.

After the 40-year period there will be a considerable decrease in the allowable cut, since 70 percent of the area is scheduled for cutting during the 40 years. There is no other alternative, without losing a large part of the timber through mortality.

The allowable cut in area and volume is shown in Table 14 for each 10-year period of the 40 years. An equal volume of timber to be cut was set up for each 10-year period. The area was then adjusted to reflect the volume.

The annual allowable cut for this planning period for the spruce-fir sawtimber type, based on the tabulation method is:

Area	1,130 acres
Volume	14,300 M B.F., Scribner Dec. C. Log Rule

This compares with other area calculations as follows:

a. Kemp formula:

$$\frac{(63{,}308 \times 7) + (11{,}221 \times 5) + (90 \times 3) + 458}{4 \times 140} = \frac{499{,}989}{560}$$

= 893 gross acres per year

625 net operable acres x 12,703.88 bd. ft./acre = 7,940 M B.F. per year

b. Straight area calculation based on rotation of 140 years:

$$\frac{75{,}077 \text{ acres}}{140 \text{ years}} = 536 \text{ gross acres per year}$$

375 net operable acres x 12,703.88 bd. ft./acre = 4,764 M B.F. per year

c. Straight area calculation based on harvesting the sawtimber stand in 40 years:

$$\frac{63{,}308 \text{ acres}}{40 \text{ years}} = 1{,}583 \text{ gross acres per year}$$

1,108 net operable acres x 12,703.88 bd. ft./acre = 14,076 M B.F. per year

The volume to be cut from the 1,450 acres of the spruce-fir sawtimber type is obtained by applying the average volume per acre as shown in Stock and Stand Table 35, and adding the net growth calculated at the midpoint for the 10-year period. The following shows the volume allowable cut broken down by species within the type. This is based on Scribner Dec. C Log Rule and is for trees 9.0 inches d.b.h. and larger in the sawtimber type.

Species	Percent of Volume	Volume M B.F.
Engelmann spruce	73	10,439
Subalpine fir	16	2,288
Lodgepole pine	11	1,573
Douglas-fir		
Total	100	14,300

Ponderosa Pine - Douglas-fir Working Group

There are 43,322 acres of ponderosa pine and 7,270 acres of Douglas-fir sawtimber type within the working circle. Of the total, 25,296 acres are considered operable at this time.

The current periodic annual net growth is 7.91 board feet per acre for ponderosa pine and 4.73 board feet for Douglas-fir. The mortality is 1.93 board feet for ponderosa pine and 2.66 board feet per acre for Douglas-fir for trees 11.0 inches d.b.h. and larger. The annual net growth for the working group is 377 M B.F. and annual mortality is 103 M B.F. The overall objective calls for cutting 24,000 acres by the end of the adjustment period. This means harvesting the overmature timber during the next 40 years.

The allowable cut in area and volume is shown in Table 14 for each 10-year period of the 40 years. An equal volume of timber to be cut was set up for each 10-year period. The area was then adjusted to reflect the volume.

The annual allowable cut for this planning period for the ponderosa pine - Douglas-fir working group, based on the tabulation method is:

Area	630 acres
Volume	1,300 M B.F. Scribner Dec. C

This compares with other area calculations as follows:

a. Kemp formula:

$$\frac{(50{,}592 \times 7) + (74{,}133 \times 5) + (135 \times 3) + 1{,}508}{4 \times 140} = \frac{726{,}722}{560}$$

= 1,298 gross acres per year

649 net operable acres x 2,070.76 bd. ft./acre = 1,344 M B.F. per year

b. Straight area calculation based on rotation of 140 years:

$$\frac{126{,}368 \text{ acres}}{140 \text{ years}} = 903 \text{ gross acres per year}$$

452 net operable acres x 2,070.76 bd. ft./acre = 936 M B.F. per year

c. Straight area calculation based on harvesting the sawtimber stand in 40 years:

$$\frac{50,592 \text{ acres}}{40 \text{ years}} = 1,265 \text{ gross acres per year}$$

632 net operable acres x 2,070.76 bd. ft./acre = 1,309 M B.F. per year

The volume to be cut from the 630 acres is obtained by applying the average weighted volume per acre and adding the average weighted net growth calculated at the midpoint for the 10-year period. The following shows the volume allowable cut broken down by species within the type. This is based on Scribner Dec. C Log Rule and is for trees 9.0 inches d.b.h. and larger in the working group.

Species	Percent of Volume	Volume M B.F.
Lodgepole pine	3	39
Engelmann spruce	2	26
Subalpine fir	2	26
Douglas-fir	41	533
Ponderosa pine	50	650
Limber pine	2	26
Total	100	1,300

Lodgepole Pine Poletimber Type

The demand for sub-sawlog size timber is not adequate to accomplish the cutting objectives. There is, however, a possibility that this demand will increase substantially during this 10-year period.

Of the total of 217,176 acres of poletimber type, 152,023 acres or 70 percent are considered operable.

Overall objectives call for putting the area in good growing condition by the year 2000 A.D. This will require converting the type from wild to managed stands during the next 40 years.

The cutting practice for the type will be to commercially thin those stands that are likely to grow to sawtimber size and to clear cut and regenerate the remainder of the type. The percentage of the type to be thinned or clear cut is determined in Table 12. This amounts to 56 percent to be thinned and 44 percent to be clear cut. Applied to the operable area of 152,023 acres, 85,132 acres are to be thinned and 66,890 acres are to be clear cut.

The current periodic annual net growth is 16.01 cubic feet per acre. The annual mortality is 1.43 cubic feet per acre.

Table 14 gives the allowable cut by area and volume, based on the tabulation method, for each 10-year period. For the first period, the allowable cut is:

Area	3,166 acres per year
Volume	2,900 M C.F. per year

The volume to be cut from the 3,166 acres of the lodgepole pine poletimber type is obtained by applying an adjusted average volume per acre taken from Stock and Stand Table 33. The adjustment was based on the percentage to be clear cut and thinned. The net growth was calculated at the midpoint of the 10-year period.

The following shows the volume allowable cut broken down by species and is for trees 5.0 inches d.b.h. and larger, to a 4.0 inch top d.o.b.

Species	Percent of Species	Volume M C.F.
Lodgepole pine	91	2,639
Engelmann spruce	2	58
Subalpine fir	4	116
Aspen	1	29
Douglas-fir	2	58
Total	100	2,900

Volume from rethinned area is not included in the calculation since there will be no re-entry into thinned areas during this planning period.

The objective in the lodgepole pine poletimber type can be met only if a particle-board, pulpwood or other similar industry utilizing small, round wood is established on the Roosevelt or on an adjacent forest.

ALLOWABLE CUT BEYOND THE 40-YEAR ADJUSTMENT PERIOD

It is estimated that the distribution of stand size classes at the end of the adjustment period for the sawtimber types will be as follows:

Stand Size Class	Lodgepole Pine	Spruce-Fir	Ponderosa Pine Douglas-fir
	M Acres	M Acres	M Acres
Sawtimber	42	11	20
Poletimber	52	--	35
Seedling-Sapling	68	40	48
Nonstocked	15	4	--

Lodgepole Pine Type

$$\frac{(42{,}000 \times 7) + (52{,}000 \times 5) + (68{,}000 \times 3) + 15{,}000}{4 \times 120} = 1{,}610 \text{ acres}$$

This would indicate that there would be no reduction in the lodgepole pine allowable cut after the adjustment period. An acceptable distribution of age classes would then be obtained by the end of the first rotation.

Spruce-Fir Type

$$\frac{(11{,}000 \times 7) + (40{,}000 \times 3) + 4{,}000}{4 \times 140} = 368 \text{ acres}$$

The Kemp formula indicates that the spruce-fir type would be reduced to 34 percent of the current allowable cut at the end of the adjustment period. Since 70 percent of this type is scheduled for cutting during the adjustment period, an acceptable distribution of age classes cannot be obtained during the second period.

Ponderosa Pine -- Douglas-fir Working Group

$$\frac{(20{,}000 \times 7) + (35{,}000 \times 5) + (48{,}000 \times 3)}{4 \times 140} = 819 \text{ acres}$$

The Kemp formula indicates that the allowable cut would not be reduced at the end of the period. An acceptable distribution of age classes would be obtained during the second period.

Table 14

Allowable Cut - Area and Volume By 10-Year Periods
Based on Present Rate of Growth

10-Year Period	Type and Stand Size Class	Board Foot Volume Per Acre Scrib. Dec. C: Area	Present	Net Growth	Total	Total Volume MMBF	Cubic Foot Volume Per Acre: Present	Net Growth	Total	Total Volume MMCF
1st	Ponderosa Pine - Douglas-fir									
	Working Group - Sawtimber	6,300	2,033.51	37.25	2,070.76	13				
	Lodgepole Pine - Sawtimber	15,900	7,910.58	58.30	7,968.88	127				
	- Poletimber	31,665					858.23	57.60	915.83	29
	Spruce-Fir - Sawtimber	11,300	12,633.73	70.15	12,703.88	143				
2nd	Ponderosa Pine - Douglas-fir									
	Working Group - Sawtimber	6,100	2,033.51	111.75	2,145.26	13				
	Lodgepole Pine - Sawtimber	15,700	7,910.58	174.90	8,085.48	127				
	- Poletimber	28,127					858.23	172.80	1,031.03	29
	Spruce-Fir - Sawtimber	11,100	12,633.73	210.45	12,844.18	143				
3rd	Ponderosa Pine - Douglas-fir									
	Working Group - Sawtimber	5,900	2,033.51	186.25	2,219.76	13				
	Lodgepole Pine - Sawtimber	15,500	7,910.58	291.50	8,202.08	127				
	- Poletimber	25,300					858.23	288.00	1,146.23	29
	Spruce-Fir - Sawtimber	11,000	12,633.73	350.75	12,984.48	143				
4th	Ponderosa Pine - Douglas-fir									
	Working Group - Sawtimber	5,700	2,033.51	260.75	2,294.26	13				
	Lodgepole Pine - Sawtimber	15,300	7,910.58	408.10	8,318.68	127				
	- Poletimber	22,990					858.23	403.20	1,261.43	29
	Spruce-Fir - Sawtimber	10,900	12,633.73	491.05	13,124.78	143				
Total	Ponderosa Pine - Douglas-fir									
	Working Group - Sawtimber	24,000								
	Lodgepole Pine - Sawtimber	62,400								
	- Poletimber	108,082								
	Spruce-Fir - Sawtimber	44,300								

CUTTING BUDGET

The 10-year cutting budget is shown in Table 15. This budget was developed so that the planned road system would traverse and open the remaining tracts of mature and overmature timber.

The cutting budget does not include lodgepole pine poletimber. If markets materialize, a budget will be set up.

Table 15

Cutting Budget - F.Y. 1962 - 1971

Compartments Listed in Priority Sequence - Roosevelt Working Circle

Compartment		Ranger	Lodgepole Pine Sawtimber Type			Spruce-Fir Sawtimber Type			Pond.Pine-Douglas-fir Sawtimber Group			Total Volume (All Types)
			Area in Acres		Volume	Area in Acres		Volume	Area in Acres		Volume	
Name	No.	District	Gross	Net	MBF	Gross	Net	MBF	Gross	Net	MBF	MBF
		TIMBER UNDER CONTRACT BUT UNCUT AS OF JULY 1, 1961										
Stuck Creek	002	Laramie River	1,450	700	3,639							3,639
Fall	009	Laramie River	342	52	424	883	138	1,622				2,046
Joe Wright	011	Laramie River	1,413	360	2,353	5,260	1,331	16,813				19,166
Trap	012	Laramie River	1,129	220	1,366	3,591	783	5,059				6,425
Lookout	027	Redfeather	42	25	485	495	17	323				808
East Bald Mountain	029	Redfeather	456	240	2,760	286	15	240				3,000
Sleeping Elephant	060	Poudre	141	89	1,696							1,696
Black Hollow	065	Poudre	2,425	364	4,477	1,030	526	4,130				8,607
Rustic	066	Poudre	600	88	457							457
Bear	090	Poudre							465	179	370	370
Total			7,998	2,138	17,657	11,545	2,810	28,187	465	179	370	46,214
		TIMBER TO BE OFFERED FOR SALE F.Y. 1962-1971										
Big South, Corral and Long Draw	015,014 & 013	Laramie River	2,850	1,560	12,430	6,111	2,936	42,570				55,000
Roaring	032	Redfeather	4,470	658	5,240	2,505	323	4,690	230	34	70	10,000
Sleeping Elephant	060	Poudre	4,740	180	1,497	4,960	173	2,503	5			4,000
Big Thompson-Bear	106	Estes Park	4,533	33	263	802	5	74	5,321	40	83	420
Johnson Creek-E.Beaver	001	Laramie River	2,043	200	1,593	326	28	407				2,000
Bald Mountain	031	Redfeather	1,124	502	4,000	1,138	472	6,000	25	3	6	10,006
Lookout	027	Redfeather	1,494	1,255	10,000	160	87	1,100				11,100
Big Beaver	064	Poudre	1,720	213	1,696	3,910	425	6,168	550	66	136	8,000
Grace Creek	003	Laramie River	507	253	2,020	1,249	547	7,930	40	24	50	10,000

(Table Continued)

Table 15 (Continued)

Cutting Budget - F.Y. 1962 - 1971

Compartment Name	No.	Ranger District	Lodgepole Pine Sawtimber Type: Area in Acres Gross	Lodgepole Pine Sawtimber Type: Area in Acres Net	Lodgepole Pine Sawtimber Type: Volume MBF	Spruce-Fir Sawtimber Type: Area in Acres Gross	Spruce-Fir Sawtimber Type: Area in Acres Net	Spruce-Fir Sawtimber Type: Volume MBF	Pond.Pine-Douglas-fir Sawtimber Group: Area in Acres Gross	Pond.Pine-Douglas-fir Sawtimber Group: Area in Acres Net	Pond.Pine-Douglas-fir Sawtimber Group: Volume MBF	Total Volume (All Types) MBF
Upper Panhandle	023	Redfeather	2,601	1,256	10,007	487	206	2,993				13,000
Upper Elkhorn	037	Redfeather	2,475	950	7,575	1,456	490	7,110	413	152	315	15,000
Big Thompson-Miller Fork	106	Estes Park	4,533	787	6,272	802	122	1,772	5,321	944	1,956	10,000
Middle St.Vrain (L1)	109	Boulder							510	483	1,000	1,000
Sawmill	010	Laramie River	1,108	753	6,000							6,000
Trail	045	Redfeather	150	78	620				2,860	1,632	3,380	4,000
Sleeping Elephant	060	Poudre	4,740	2,161	17,222	4,960	1,986	28,778	5			46,000
Middle St. Vrain	109	Boulder	2,123	276	2,201	4,647	531	7,696	385	50	103	10,000
South Boulder (L2)	111	Boulder							1,000	966	2,000	2,000
N.&S. Fish and Sheep	086,087, 088	Poudre	1,623	789	6,286	835	356	5,165	580	265	549	12,000
Little Beaver (L3)	068	Poudre	2,485	1,144	9,118	1,625	657	9,524	1,495	656	1,358	20,000
Little Thompson	107	Estes Park							620	579	1,200	1,200
North St. Vrain (L3)	108	Estes Park							415	386	800	800
Twin Lakes,Nunn Creek, Tunnel	008,017 033	Laramie River Redfeather	8,503	3,599	28,680	2,063	766	11,112	250	100	208	40,000
Middle St. Vrain	109	Boulder	2,123	277	2,201	4,647	531	7,696	385	50	103	10,000
Middle St. Vrain (L4)	109	Boulder							510	483	1,000	1,000
La Garde	004	Laramie River	2,577	1,274	10,152	3,290	1,429	20,702	145	70	146	31,000
Sevenmile,Roaring and Divide	036,032 030	Redfeather	5,672	1,896	15,109	3,521	1,033	14,983	1,379	438	908	31,000
Big Thompson (L5)	106	Estes Park							1,000	966	2,000	2,000
May	061	Poudre	2,145	1,598	12,734	1,610	1,054	15,266				28,000
Total			66,339	21,692	172,916	51,104	14,157	204,239	23,444	8,387	17,371	394,526

(L3) - Little Thompson - (S.1,2,3,9 and 10, T. 3N. A.72W. S.31,T.4N., R.71W)
North St. Vrain - (Coulson, Big Hollow & Rattlesnake)-(S.6, T.3N., A.71W, S.1,2,10,11,12,15,16 & 17.,T.3N., R.72W)

(L2) - South Boulder - (Forsaint Drainage)(Sec.19, T1S, R71W, Sec. 23 & 24, T1S, R72W)

(L1) - Middle St. Vrain - (Deer Creek Drainage) (Sec. 9 & 16 T2N, R.71W)

(L4) - Middle St. Vrain - (James Drainage) (Sec. 25 & 26, T2N, R72W)

(L5) - Big Thompson - (N. Fork) (S.19, 20, 21, 27, 28, 29, & 30, T. 6 N., R. 71 W)

TRANSPORTATION

The road survey and construction program for the 10-year period is given in Table 16. This program is correlated with the cutting budget shown in Table 15.

In some cases, because of the high cost per M B.F. to construct the road to the design standard shown, it will be necessary to supplement purchaser construction by all-purpose funds. Where there is insufficient all-purpose use to justify the application of such funds, it may be advisable to postpone sale of the timber. In other instances, stage construction within the "section" surveyed for the higher standard may be applicable. Economic conditions and the demand for other resource use at the time of preparing the timber sale will determine action to be taken.

Right-of-Way Needs

The list below shows when action is to be taken to obtain rights-of-way needed for roads in Table 16. More specific information on right-of-way acquisition is contained in the reports called for by FSH 5407 and 5492. Timber management and engineering staffmen will work together closely to correlate action to obtain rights-of-way sufficiently in advance to avoid delaying timber sales.

ROADS NEEDING RIGHT-OF-WAY ACTION

Road Number	Name	Year Action Required
1629	Storm Mountain	F.Y. 1962
1683	Beaver Creek	1962
1695	Tatham	1962
1682	George Creek	1962
1637	Little Beaver	1963
1688	Panhandle	1963
1632	Springtown Gulch	1964
1700	Roach	1965
1707	Shipman Park	1965
1628	Hyatt	1965
1685	Mizell	1966
1636	Fish Creek	1967
1706	British Creek	1968
1698	Old Glendevey	1968
1694	McIntyre Glen	1968
1617	Antelope Park	1969

In addition to the preceding, practically all compartments in the eastern part of the forest involve right-of-way needs. These compartments contain the ponderosa pine --Douglas-fir timber scheduled for cutting to meet the cutting budget in Table 15. The right-of-way situation in this part of the forest is so complex that it is not practicable to list anticipated needs. Specific needs will be listed as far as possible in advance in the annual right-of-way reports.

Table 16

Timber Access Road Development Program F.Y. 1962-1971
Combination Forest Service-Purchaser Construction

Compartment Name	Compartment No.	Road	Road No.	Estimated Length in Miles	Estimated Volume Served By Road (MMBM)	Estimated Cost	Road Standard	Current Survey Status
Sleeping Elephant	060	Mummy	1643	3.0	8.0	45,000	SH	Survey Completed
Big South	015	Peterson Lake	1659	4.0	26.0	60,000	SH	Survey F.Y. 1962-Const. F.Y. 1963
Corral	014	Corral Park	1658	3.0	24.0	45,500	SH	Survey F.Y. 1962-Const. F.Y. 1963
Long Draw	013	Long Draw	1656.2	9.7	60.0	145,500	SH	Survey 4.7 miles F.Y.1962-Const.F.Y. 1963
Roaring	032	S. Bald Mountain	1674	2.0	3.0	30,000	SH	Survey F.Y. 1962-Const. F.Y. 1963
Roaring	032	Roaring	1676	4.5	17.0	67,500	SH	Survey completed-Const. F.Y. 1963
Grace Creek	003	Tatham	1695	7.0	19.0	105,000	SH	Survey F.Y. 1962-Const. F.Y. 1964
Grace Creek	003	Roach	1700	5.0		75,000	SH	Survey F.Y. 1962-Reconst. F.Y. 1964
Grace Creek	003	Grace Creek	1701	3.0		45,000	SH	Survey F.Y. 1962-Const. F.Y. 1964
Big Thompson	106	Storm Mountain	1629	8.0	20.0	120,000	SH	Survey F.Y. 1962-Const. F.Y. 1963
E. Bald Mountain	029	Elkhorn Divide	1666	4.0	7.0	60,000	SH	Survey F.Y. 1962-Const. F.Y. 1963
Upper Elkhorn	037	Elkhorn	1672	4.0	38.0	60,000	SH	Survey F.Y. 1963-Const. F.Y. 1964
Big Beaver	064	Cirque	1647	5.7	16.0	85,500	SH	Survey F.Y. 1963-Const. F.Y. 1964
Upper Panhandle	023	Pearl Creek	1669.2	5.0	26.0	15,000	SH	F.Y.1963-Complete 2.0 miles survey const.F.Y.'64
Bald Mountain and	031	Bald Mountain						
Upper Lone Pine	038	Elkhorn	1671	6.0	23.0	90,000	SH	Survey F.Y. 1963-Const. F.Y. 1963
Sawmill	010	Sawmill Creek	1660	2.0	14.0	30,000	SH	Survey F.Y. 1963-Const. F.Y. 1965
Sleeping Elephant	060	Mummy	1643	6.0	100.0	90,000	SH	Survey F.Y. 1963-Const. F.Y. 1965
Sleeping Elephant	060	East Fork	1642	8.0		120,000	SH	Survey F.Y. 1963-Const. F.Y. 1965
Sleeping Elephant	060	Sheep Creek	1644	8.0		120,000	SH	Survey F.Y. 1963-Const. F.Y. 1965
Little Beaver	068	S. Bennett Creek	1640	2.5	43.0	37,500	SH	Survey F.Y. 1963-Const. F.Y. 1966
Little Beaver	068	Jacks Gulch	1638	6.3		94,500	SH	Survey F.Y. 1963-Const. F.Y. 1966
Little Beaver	068	Little Beaver	1637	6.0		90,000	SH	Survey F.Y. 1963-Const. F.Y. 1966
Middle St. Vrain	109	St. Vrain	1614	3.0	10.0	45,000	SN	Survey F.Y. 1963-Const. F.Y. 1965
Middle St. Vrain	109	Cave Creek	1615	6.0		90,000	SN	Survey F.Y. 1963-Const. F.Y. 1965
N. & S. Fish and	086,087							
Sheep	088	Springtown Gulch	1632	5.0	18.0	75,000	SN	Survey F.Y. 1964-Const. F.Y. 1966

(Table Continued)

Table 16(Continued)

Timber Access Road Development Program F.Y. 1962-1971
Combination Forest Service-Purchase Construction

Compartment Name	Compartment No.	Road	Road No.	Estimated Length in Miles	Estimated Volume Served By Road (MMBM)	Estimated Cost	Road Standard	Current Survey Status
Chambers, Twin Lakes	016	Green Ridge	1675	17.5	80.0	262,500	SH	Survey F.Y. 1964-Const. F.Y. 1966
Tunnel and	008,017							
Nunn	033	Boulder Ridge-Nunn Cr.	1677	10.0		150,000	SH	Survey F.Y. 1964-Const. F.Y. 1966
La Garde	004	Roach	1700	7.0	62.0	105,000	SH	Survey F.Y. 1965-Reconst. F.Y. 1967
La Garde	004	Shipman Park	1707	2.0		30,000	SH	Survey F.Y. 1965-Reconst. F.Y. 1967
La Garde	004	Housmer Park	1705	6.0		90,000	SH	Survey F.Y. 1965-Reconst. F.Y. 1967
Divide	030	N. Bald Mountain	1673	4.6	17.0	69,000	SH	Survey F.Y. 1965-Const. F.Y. 1967
Roaring	032	Roaring	1676	5.0	40.0	75,000	SH	Survey F.Y. 1965-Const. F.Y. 1967
Sevenmile	036	Bald Mtn.-Elkhorn	1671	8.0	10.0	120,000	SH	Survey F.Y. 1965-Const. F.Y. 1967
Big Thompson	106	Hyatt	1628	5.0	4.0	75,000	SH	Survey F.Y. 1965-Const. F.Y. 1967
May	061	Mummy	1643	4.0	37.0	60,000	SH	Survey F.Y. 1966-Const. F.Y. 1968
Johnson Creek	001	Roach	1700	6.0	20.0	90,000	SH	Survey F.Y. 1967-Reconst. F.Y. 1969
Johnson Creek	001	Pole Creek	1703	6.5		97,500	SH	Survey F.Y. 1967-Reconst. F.Y. 1969
Johnson Creek	001	Kings Canyon	1704	1.4		21,000	SH	Survey F.Y. 1967-Const. F.Y. 1969
Osborn and Eaton	020,021	Beaver Creek	1683	5.0	17.0	75,000	SH	Survey F.Y. 1967-Const. F.Y. 1969
Osborn and Eaton	020,021	Mizell	1685	1.0		15,000	SH	Survey F.Y. 1967-Const. F.Y. 1969
Osborn and Eaton	020,021	Sand Creek	1686	4.0		60,000	SH	Survey F.Y. 1967-Reconst. F.Y. 1969
Little Thompson	107	Pole Hill	1622	3.0	4.0	45,000	SH	Survey F.Y. 1967-Reconst. F.Y. 1969
Crystal & Cascade	084,085	Springtown Gulch	1632	3.0	4.0	45,000	SH	Survey F.Y. 1968-Reconst. F.Y. 1970
Fish Creek	069	Fish Creek	1636	4.8	16.0	72,000	SH	Survey F.Y. 1968-Const. F.Y. 1971
Middle St. Vrain	109	St. Vrain	1614	3.0	10.0	45,000	SN	Survey F.Y. 1968-Const. F.Y. 1971
McIntyre Creek	005	Old Glendevey	1698	5.0	21.0	75,000	SH	Survey F.Y. 1970-Const. F.Y. 1972
McIntyre Creek	005	British Creek	1706	7.0		105,000	SH	Survey F.Y. 1970-Const. F. Y. 1972
McIntyre Creek	005	McIntyre Glen	1694	1.4		21,000	SN	Survey F.Y. 1970-Const. F.Y. 1972
Pennock	071	Pennock Creek	1650	4.0	25.0	60,000	SH	Survey F.Y. 1971-Const. F.Y. 1973
N. St. Vrain	108	Antelope Park	1617	6.0	4.0	90,000	SN	Survey F.Y. 1971-Const. F.Y. 1973

SALES POLICY

Sufficient timber will be made available to operators to keep a 2 to 3 years' supply of timber under contract at all times.

At present the established mill capacity is not adequate to harvest the allowable cut. The establishment of new industry will be encouraged by offering timber in blocks of sufficient size to attract such industry.

The following is a guide for the size of timber sales within the working circle:

1. For mills cutting 10 million or more board feet per year, sales will be from 30 to 100 million board feet.

2. For mills cutting 3 to 8 million board feet per year, sales will be from 10 to 20 million board feet.

3. For mills cutting less than 3 million board feet, sales will be from 1 to 5 million board feet.

Points of Manufacture

At the present time, logical points for lumber manufacture are Fort Collins and Walden, Colorado, and Laramie, Wyoming. Ordinarily, the timber will be appraised to the railhead of greatest advantage to the government.

Merchantability Specifications

The minimum size tree in lodgepole pine sawtimber will be 8.0 inches to 10.0 inches d.b.h. to a 6.0 inch top d.i.b. In other species the minimum size tree for sawtimber will be 10.0 inches d.b.h. to an 8.0 inch top d.i.b. Stump height for lodgepole pine sawtimber will be 8 inches. For other species it will be 12 inches.

Logging Methods

1. Lodgepole Pine
   Use of tractors, animals or jammers for skidding is acceptable. When tractors are used, the maximum allowable size will ordinarily be specified in the contract.

2. Spruce-fir
   The same class of logging equipment may be used in this type as in lodgepole pine. The potential for build-up of Engelmann spruce bark beetle populations in this type will require special considerations such as disposal of cull and

slash material of large size. Complete slash disposal, entire tree skidding, with slash and cull disposal at the landing or other such methods will be considered for approval on an individual basis.

3. Ponderosa Pine -- Douglas-fir

The same class of logging equipment except for jammers, may be used in this working group as in the above two types. Care will be taken to protect the residual stand from excessive logging damage. Slash disposal will generally be by lopping and scattering.

STAND IMPROVEMENT

1. Reforestation Survey

The 1957 timber inventory indicates that 2,648 acres of commercial forest land in the working circle are nonstocked and 1,181 acres in the seedling-sapling type are poorly stocked. At the time of the inventory, part of this area contained reproduction smaller than the ½-foot minimum height considered in the survey. Also, the degree of understocking and the condition of poorly stocked stands were not considered. Prior to making a detailed reforestation plan, therefore, an intensive survey will be made of these areas to determine actual planting needs. This will be accomplished by F.Y. 1964.

2. Planting

Pending completion of the reforestation survey described above, 50 percent of the nonstocked area and poorly stocked seedling-sapling stands, as shown in the timber inventory, will be considered as needing planting. The total planting job and that needed in the current 10-year period is shown in Table 17.

3. Measures to Aid or Control Natural Regeneration

In the spruce-fir type, logging and slash disposal methods will be used, where practicable, which will result in an improved seedbed as an aid to natural regeneration. The selection of methods to be applied will also consider the needs of insect control.

In the lodgepole pine type, slash disposal methods will be varied as necessary to aid in controlling the amount and distribution of reproduction.

4. Thinning

a. Noncommercial

Thinning of new growth in lodgepole pine will be done on 5,500 acres of lodgepole pine type during the 10-year period. This will be accomplished with sale area betterment deposits.

In addition, noncommercial thinning using appropriated funds, will be done in this period on 5,270 acres of overstocked seedling-sapling stands.

Some of the acres classified as medium-stocked seedling-sapling stand will be in need of thinning. A closer look will be taken at these areas during the first 10-year period.

b. Commercial

Commercial thinning of lodgepole pine stands is needed on 121,900 acres. No substantial gain can be made in the thinning job until new industry is established to utilize small, round material. The forest will work toward the establishment of such an industry by the end of the present 10-year period. Commerical thinning of lodgepole pine pole stands will be done on 2,000 acres during the current 10-year period.

Table 17

THE PLANTING JOB - F.Y. 1962 to 1971

Species	Planting Needed on Nonstocked Areas* (acres)	Understocked Seedling-Sapling Stands Needing Regeneration* (acres)	80 Years & Older Pole Stands to be Clearcut and Planted (acres)	Regeneration Needed on Sawtimber Stands Cutover After F.Y. 1960 (acres)	Aspen Stands to be Converted to Conifer By Planting (acres)	Total (acres)
Ponderosa Pine-Douglas-fir	760	50		2,180		2,990
Lodgepole Pine	340	440	5,300	4,230		10,310
Spruce-Fir	230	10		14,400		14,640
Aspen					1,315	1,315
Total	1,330	500	5,300	20,810	1,315	29,255

*Actual planting job to be determined by field examination. For planning purposes, this is estimated as 50% of the timber inventory nonstocked and poorly stocked area.

(Table continued)

Table 17 (Continued)

THE PLANTING JOB - F.Y. 1962 to 1980

Species	Planting Needed on Nonstocked Areas (Acres)	Understocked Seedling-Sapling Stands Needing Regeneration (Acres)	80 Years & Older Pole Stands to be Clearcut and Planted (Acres)	Regeneration Needed on Sawtimber Stands Cutover After F.Y. 1960 (Acres)	Conifer Stands to be re-established in Aspen Type (Acres)	Total (Acres)
Ponderosa Pine-Douglas-fir	760	50		4,360 1/		5,170
Lodgepole Pine	340	440	10,600 2/	8,460 1/		19,840
Spruce-Fir	230	10		28,800 3/		29,278
Aspen					2,630 4/	2,630
Total	1,330	500	10,600	41,620	2,630	56,918

1/ 20% of total area to be cut over.
2/ 20% of total pole stands to be clearcut.
3/ Planting a minimum of 300 trees per acre.
4/ 25% of total aspen area.

PROTECTION

Insects

a. Insect Conditions

Bark beetle activity has been light during the past 10 years in lodgepole pine and Engelmann spruce. An increase, however, has been noted in the activity of the Engelmann spruce bark beetle (Dendroctonus engelmanni) in recently logged spruce areas.

Some pandora moths (Coloradia pandora) have been found on the north part of the Laramie River District. This infestation will be watched and spray control measures started if advisable.

For several years the Black Hills beetle (Dendroctonus ponderosae, Hopk.) has been killing ponderosa pine in the fringe areas of the forest and on intermingled holdings of State and private land. The results of these infestations are clearly evident in the large patches of dead timber which are scattered throughout old and relatively new areas of infestation. Much of the timber killed is of low commercial value. It is, however, of high value from recreational and watershed protection standpoints.

Douglas-fir beetle (Dendroctonus pseudotsugae, Hopk.) infestations have killed scattered clumps of trees in the lower elevations of the Douglas-fir type. No control measures have been initiated.

Limited spruce budworm outbreaks have occurred in areas east of Estes Park, Colorado. In 1960, very light defoliation was detected in the Sugarloaf Mountain area of the Boulder District. No control measures have been initiated.

b. Action Program

To facilitate all insect control and to harvest infested timber, access is essential. This can be favored by continuing the policy of clear cutting 50 percent to 60 percent of the area which is in mature stands, thus extending the road system at about twice the rate as for a complete clear cut.

The planned action for insect control, by timber types, is as follows:

1. Lodgepole pine type
   A continuing, carefully administered detection program will be maintained so that potential epidemics can be recognized and controlled.

2. Spruce-fir type

Engelmann spruce logging slash and cull material will be bunched and burned prior to the emergence of the spruce bark beetles. This may be done by skidding entire trees to a landing or by any other method that will bunch the material for burning. New timber sale contracts will require such slash disposal methods. Also, extended contracts and those that provide for rate redetermination will be modified to provide this kind of insect control requirement.

3. Ponderosa pine type

Since the Black Hills bark beetle has caused heavy losses in the past 10 years, a continuing maintenance program will be followed. A program of this type will help prevent the development of epidemic populations of the Black Hills bark beetle.

Disease

a. Dwarfmistletoe Control

About 50 percent of the lodgepole pine stands are infected with dwarfmistletoe (Arceuthobium americanum). In the ponderosa pine type another species (Arceuthobium vaginatum) infects 30 to 40 percent of the stands. This represents a total of about 156,000 acres of commercial timber land.

In the lodgepole pine type, control measures in the cut-over areas have consisted of destroying residual standing trees by broadcast burning, poisoning or girdling or by felling the trees, followed by windrowing and burning the material.

In the ponderosa pine type, control has been limited to marking for cutting all heavily infected trees on timber sale areas. In some areas of heavy infection, it will be necessary to clear cut the stand.

In both these sawtimber types a total of 8,000 acres of cut-over area is in need of dwarfmistletoe control work. This area is on current timber sales and on those cut over within the past 10 years.

Dwarfmistletoe-infected and stagnated poletimber stands total 48,000 acres. Currently, sales of small, round material are being made in such poletimber stands to reduce the infection.

b. The 10-year Control Program

Presale layout will consider the location and extent of dwarfmistletoe infection. Where practicable, cutting units will include the areas of heavy infection. Residual trees on sawtimber cut-over areas will then be destroyed by cutting or girdling. This will amount to 32,000 acres in the 10-year period.

In addition, a survey will be made of areas cut over during the last 10 years to determine dwarfmistletoe control needs. This survey will be completed by F.Y. 1965. Pending completion, 300 acres will be treated annually, using P&M and K-V Funds.

Animals

a. Porcupines

Forest Service crews will be instructed to destroy porcupines seen in the course of regular work. In addition, forest users and the general public will be encouraged to kill porcupines.

Fire

a. Slash Disposal

An effective slash disposal program was started on the forest in 1958. By 1960, a total of 500 acres of cut-over land had been treated by prescribed burning, and the residual stand on an additional 194 acres had been felled and mechanically piled for burning.

b. The 10-Year Program

1. Continue the slash disposal program started in 1958. Complete slash disposal will be accomplished on 60 to 70 percent of the area to be clear cut. This will amount to 70,000 acres on which piling and burning will be done in the 10-year period.

2. Construct 18 miles of firebreak through older clear-cut areas in accordance with the findings of the 1960 fire replanning analysis. Appropriated funds will be used.

ACQUISITION

The recent and tentative program is as follows:

1. Since 1958, 7,039 acres of selected lands and 2,608 acres of offered lands have been consummated in land exchanges. Present exchanges, nearly completed, total 10,334 acres of selected lands and 981 acres of offered lands. This totals 17,373 acres of national forest land exchanged for 3,589 acres of private land or a ratio of five to one. Except for 160 acres of national forest land remaining in the Rist Compartment, all public lands in the Redstone, Happy Hollow, Horsetooth, Rist, Lewstone, Youngers, Groves, Longs, Mill Canyon, Soldier Canyon and Caphorn Compartments have gone to private ownership or will be in private ownership after consummation of present exchanges. Acreages and volumes involved in these exchanges have been included in this working circle plan. It will be necessary to post these changes to the timber management compartment record sheets and to consider the acreage and volumes in adjusting the allowable cut after this plan has been in effect five years. Since considerable acreage of national forest land is involved in present exchanges, it was not considered advisable to make adjustments in allowable cut and volumes until all present exchanges are completed.

2. The forest land exchange plan sets up three priorities for designating areas considered to be most desirable for acquiring. The first priority lands total approximately 28,510 acres which are about 57 percent timbered. The plans will consider the use of tripartite exchanges in the next 10-year period.

SUPPORTING DATA

Compartment Records

Within 1 year after the approval of this plan, a system of compartment records will be set up for each ranger district. This will consist of form R2-2400-19 and a map for each compartment within the ranger district. These will be maintained in an atlas-size binder. Form R2 2400-19 will be posted at least once annually. Since balances may be struck at any time, the form provides for a continuous inventory of the compartment. Compartment descriptions for at least those compartments scheduled for cutting during the 10-year period will also be included in the atlas binder. Such descriptions may be made on the back of form R2-2400-19.

Timber Inventory

The inventory data on which this plan revision is made was obtained from the Cooperative Forest Survey--Region 2 Inventory Program conducted in 1957.

The inventory was conducted to standards prescribed and agreed to by the Forest Survey Branch of the Intermountain Forest and Range Experiment Station and the Division of Timber Management of Region 2 (Ref: Field Instruction for Forest Inventory, Rocky Mountain Region 1956). The Forest Survey Branch read the plots and processed the data. Region 2 delineated the types on aerial photographs, transferred the types to planimetric maps, printed the final type maps and calculated the area of the types.

Sampling Error

Volume data was based on plots taken at the following number of locations. Two plots were taken at each location.

Type	Stand Size Class	Stocking Class	No. of Locations
Douglas-fir	Sawtimber	All	9
"	Poletimber	All	7
Ponderosa Pine	Sawtimber	Medium	3
"	Sawtimber	Poor	32
"	Poletimber	Well	2
"	Poletimber	Medium	4
"	Poletimber	Poor	14
"	Nonstocked	---	3
Lodgepole Pine	Sawtimber	Well	1
"	Sawtimber	Medium	22
"	Sawtimber	Poor	8
"	Poletimber	Well	15
"	Poletimber	Medium	25
"	Poletimber	Poor	4
"	Seedling-Sapling	Well	4
"	Seedling-Sapling	Medium	2
"	Seedling-Sapling	Poor	2
Limber Pine	Poletimber	Poor	1
Spruce-Fir	Sawtimber	Well	4
"	Sawtimber	Medium	17
"	Sawtimber	Poor	9
"	Poletimber	Well	1
"	Poletimber	Poor	2
Aspen	Poletimber	All	2
"	Seedling-Sapling	All	1
Total			194

It was estimated that plots in the above number would give a sampling error per cubic foot volume of not to exceed 5 percent (one standard error) for the working circle.

There is no sampling error for the determination of area, since such was based upon a 100 percent mapping job.

Data Processing

Forest Survey of the Intermountain Forest and Range Experiment Station processed the data through the IBM Section of the Pacific Southwest Station. This was done in accordance with the "Plan for Compilation of the Intermountain Forest Survey, Rocky Mountain Area by IBM Method" October 1, 1956 by Robert M. Miller.

The NFA Tables are on file in the forest supervisor's office. These are:

Area

NFA 2 - Compartment Area
NFA 3 - Block Area Summary
NFA 4 - Working Circle Area Summary

Volume

NFA 6 and 7 - Average volume per acre by volume stratum.
NFA 31 - Adjusted 10 year gross growth and 10 year mortality. (10 years past)
Miscellaneous Tables - Number of trees per acre and various Forest Survey Summaries.

Copies of the plot tally sheets are on file in the forest supervisor's office.

Aerial photographs on which the photo interpretation was done are on file at the Denver Federal Record Storage Center.

Photographic plates from which the type maps were printed are stored in the Division of Timber Management, Forest Service, Denver, Colorado.

Method for Calculating Periodic Annual Net Growth

Basic data is from Table NFA 31 in Forest Survey IBM binder on file in the forest supervisor's office.

Growth and mortality may be calculated for the species and the size classes within the species.

Merchantability Class 1 for each species in Table NFA 31 gives the 10-year gross growth.

Merchantability Class 7 for each species in Table NFA 31 gives the 10-year mortality.

The difference between the two is the net 10-year growth and this figure divided by 10 gives the annual net growth.

Table 18

Relation Between Site Tree Age Classes and Size Classes

Type	Age Class (Years)	Stand Size Class: Nonstocked No. of Trees	Nonstocked Percent	Seedling-Sapling No. of Trees	Seedling-Sapling Percent	Poletimber No. of Trees	Poletimber Percent	Sawtimber No. of Trees	Sawtimber Percent
Lodgepole Pine	1- 19								
	20- 39			4	25	1	1		
	40- 59					14	16		
	60- 79			7	44	35	39	1	1
	80- 99			3	19	18	20	3	5
	100-119			1	6	5	6	3	5
	120+			1	6	16	18	56	89
Total				16	100	89	100	63	100
Douglas-fir	1- 19								
	20- 39								
	40- 59					4	27	1	5
	60- 79					10	67	1	5
	80- 99					1	6	2	11
	100-119							2	11
	120-139								
	140+							13	68
Total						15	100	19	100
Engelmann Spruce	1- 19								
	20- 39								
	40- 59								
	60- 79					1	33		
	80- 99								
	100-119								
	120-139					1	33	3	6
	140+					1	34	51	94
Total						3	100	54	100

Table 18 (Continued)

Relation Between Site Tree Age Classes and Size Classes

Type	Age Class (Years)	Stand Size Class: Nonstocked No. of Trees	Nonstocked Percent	Seedling-Sapling No. of Trees	Seedling-Sapling Percent	Poletimber No. of Trees	Poletimber Percent	Sawtimber No. of Trees	Sawtimber Percent
Ponderosa Pine	1- 19								
	20- 39					1	3		
	40- 59	1				11	36	2	3
	60- 79	1				9	29	12	16
	80- 99	1				3	10	13	17
	100-119	1				1	3	9	12
	120+	2				6	19	39	52
Total		6	100			31	100	75	100
Subalpine Fir	1- 19								
	20- 39								
	40- 59					1	50		
	60- 79					1	50	2	50
	80- 99							1	25
	100-119							1	25
	120-139								
	140+								
Total						2	100	4	100

Table 19

Annual Growth and Mortality Per Acre By Major Sawtimber Types

Type	Douglas-fir									Ponderosa Pine								
	Percent Species In Type			Net Growth			Mortality			Percent Species In Type			Net Growth			Mortality		
	Int. ¼" BF	Scrib: Dec.C BF	Cu. Ft.	Int. ¼" BF	Scrib: Dec.C BF	Cu. Ft.	Int. ¼" BF	Scrib: Dec.C BF	Cu. Ft.	Int. ¼" BF	Scrib: Dec.C BF	Cu. Ft.	Int. ¼" BF	Scrib: Dec.C BF	Cu. Ft.	Int. ¼" BF	Scrib: Dec.C BF	Cu. Ft.
Douglas-fir	60	59	61	1.31	1.17	0.54	1.43	1.14	0.34	18	17	15	0.39	0.34	0.13	0.43	0.33	0.08
Ponderosa Pine	28	29	24	3.20	2.73	0.68	0.58	0.45	0.13	78	79	79	8.92	7.43	2.25	1.61	1.23	0.43
Lodgepole Pine	3	3	8	0.38	0.31	0.42	0.38	0.32	0.29	2	2	3	0.26	0.22	0.16	0.26	0.22	0.11
Limber Pine, etc	2	2	1	0.01						1	1	1						
Subalpine Fir	2	3	4	-0.20	-0.25	-0.08	0.38	0.46	0.26	1	1	0	-0.10	-0.08		0.19	0.15	
Engelmann Spruce	5	4	2	1.10	0.77	0.11	0.42	0.29	0.03									
Blue Spruce																		
Aspen												2						
Total	100	100	100	5.80	4.73	1.67	3.19	2.66	1.05	100	100	100	9.47	7.91	2.54	2.49	1.93	0.62

(Table Continued)

Table 19 (Continued)

Annual Growth and Mortality Per Acre by Major Sawtimber Types

Type	Lodgepole Pine									Spruce-Fir								
	Percent Species In Type			Net Growth			Mortality			Percent Species In Type			Net Growth			Mortality		
	Int. ¼" BF	Scrib. Dec.C BF	Cu. Ft.	Int. ¼" BF	Scrib. Dec.C BF	Cu. Ft.	Int. ¼" BF	Scrib. Dec.C BF	Cu. Ft.	Int. ¼" BF	Scrib. Dec.C BF	Cu. Ft.	Int. ¼" BF	Scrib. Dec.C BF	Cu. Ft.	Int. ¼" BF	Scrib. Dec.C BF	Cu. Ft.
Douglas-fir			1			0.01			0.01									
Ponderosa Pine																		
Lodgepole Pine	80	78	80	10.23	8.78	4.15	10.25	8.45	2.90	12	11	12	1.53	1.24	0.62	1.54	1.19	0.43
Limber Pine, etc																		
Subalpine Fir	5	5	7	-0.51	-0.41	-0.14	0.94	0.77	0.45	17	16	24	-1.72	-1.32	-0.49	3.19	2.48	1.54
Engelmann Spruce	15	17	12	3.29	3.29	0.65	1.26	1.23	0.20	71	73	64	15.56	14.11	3.48	5.96	5.30	1.08
Blue Spruce																		
Aspen																		
Total	100	100	100	13.01	11.66	4.67	12.45	10.45	3.56	100	100	100	15.37	14.03	3.61	10.69	8.97	3.05

Table 20

Annual Growth and Mortality Per Acre By Major Poletimber Types

Species	Ponderosa Pine			Lodgepole Pine			Spruce-Fir		
	Percent of Species	Net Growth CF	Mortality CF	Percent of Species	Net Growth CF	Mortality CF	Percent of Species	Net Growth CF	Mortality CF
Douglas-fir	19	0.35	0.04	2	0.04	0.03			
Ponderosa Pine	74	1.49	0.17						
Lodgepole Pine	6	1.05	0.01	91	15.91	1.30	9	0.08	
Limber Pine, etc.							10	0.09	
Subalpine Fir				4	0.04	0.06	36	0.32	0.01
Engelmann Spruce				2	0.02	0.03	45	0.41	0.01
Blue Spruce	1	0	0						
Aspen				1	0	0.01			
Total	100	2.89	0.22	100	16.01	1.43	100	0.90	0.02

Table 21

Annual Growth and Mortality Per Acre
By Stand Size Classes and Species

Stand Size Class	Douglas-fir			Ponderosa Pine			Lodgepole Pine			Limber Pine			Subalpine Fir			Engelmann Spruce		
	Board Foot			Board Foot			Board Foot			Board Foot			Board Foot			Board Foot		
	Int. 1/4"	Scrib. Dec. C	Cubic Foot	Int. 1/4"	Scrib. Dec. C	Cubic Foot	Int. 1/4"	Scrib. Dec. C	Cubic Foot	Int. 1/4"	Scrib. Dec. C	Cubic Foot	Int. 1/4"	Scrib. Dec. C	Cubic Foot	Int. 1/4"	Scrib. Dec. C	Cubic Foot
Sawtimber																		
Gross Growth	4.58	3.92	1.44	13.49	10.97	3.39	25.60	22.09	8.81	0.30	0.24	0.13	8.64	7.21	4.36	30.31	26.59	7.13
Mortality	2.39	1.94	0.55	2.06	1.56	0.54	12.81	10.83	3.62				18.79	15.47	6.41	8.40	7.26	1.69
Net Growth	2.19	1.98	0.89	11.43	9.41	2.85	12.79	11.26	5.19	0.30	0.24	0.13	-10.15	-8.26	-2.05	21.91	19.33	5.44
Poletimber																		
Gross Growth	3.08	2.52	1.88	5.67	4.40	2.25	6.79	5.65	18.91	0.31	0.29	0.18	0.84	0.68	1.13	1.60	1.33	0.93
Mortality			0.02	0.18	0.12	0.23	2.66	2.12	1.43			0.01	1.10	0.91	0.23			0.03
Net Growth	3.08	2.52	1.86	5.49	4.28	2.02	4.13	3.53	17.48	0.31	0.29	0.17	-0.26	-0.23	0.90	1.60	1.33	0.90
Seedling-Sapling																		
Gross Growth				0.43	0.41	0.07	4.83	4.11	6.05									
Mortality							6.57	5.40	4.53									
Net Growth							-1.74	-1.29	1.52									

Note: Sawtimber 11.0" D.B.H. and larger.
Cubic Feet 5.0" D.B.H. and larger.

Table 22

Average Net Volume Per Acre By Species and Crown Density Classes

DOUGLAS-FIR SAWTIMBER TYPE

Species	Crown Density Classes: Well and Medium (VS-02) Int. ¼" BF	Well and Medium (VS-02) Scrib. Dec. C BF	Well and Medium (VS-02) Cubic Feet	Poor (VS-03) Int. ¼" BF	Poor (VS-03) Scrib. Dec. C BF	Poor (VS-03) Cubic Feet	Average Int. ¼" BF	Average Scrib. Dec. C BF	Average Cubic Feet	Percent of Species Based on Int. ¼" BF	Percent of Species Based on Scrib. Dec. C BF	Percent of Species Based on Cubic Feet
Douglas-fir	3,104.24	2,566.03	949.10	1,456.05	1,135.50	434.50	1,922.63	1,540.45	580.17	60	59	61
Ponderosa Pine	831.33	700.00	184.03	939.36	799.79	247.63	908.78	771.54	229.63	28	29	24
Lodgepole Pine			133.38	137.17	107.93	48.91	98.34	77.38	72.82	3	3	8
Limber Pine	222.88	193.50	41.07				63.09	54.78	11.63	2	2	1
Subalpine Fir				110.88	90.72	51.04	79.49	65.04	36.59	2	3	4
Engelmann Spruce	382.80	350.18	73.62				108.36	99.13	20.84	5	4	2
Total	4,541.25	3,809.71	1,381.20	2,643.46	2,133.94	782.08	3,180.69	2,608.32	951.68	100	100	100
Area in Volume Stratum												
Acres		2,058			5,212			7,270				
Percent		28			72			100				

Table 23

Stock and Stand Table By D.B.H. and Crown Density Classes

DOUGLAS-FIR SAWTIMBER TYPE

Average Per Acre

D.B.H. Classes 10" Class	D.B.H. Classes 2" Class	Crown Density Classes: Well and Medium (VS-02) No. of Trees	Int. ¼" BF	Scrib. Dec. C BF	Cubic Feet	Poor (VS-03) No. of Trees	Int. ¼" BF	Scrib. Dec. C BF	Cubic Feet	Average No. of Trees	Int. ¼" BF	Scrib. Dec. C BF	Cubic Feet
0	1.0- 2.9	84				100				95			
	3.0- 4.9	83				200				167			
1	5.0- 6.9	83			121.98	70			109.38	74			112.95
	7.0- 8.9	67			293.96	25			79.24	37			140.02
1	9.0- 9.9	8	63.33	47.50	19.60	10	192.00	134.40	49.98	9	155.58	109.80	41.38
	10.0-10.9					5	172.80	120.00	42.14	4	123.88	86.03	30.21
2	11.0-12.9	12				11				11			
	13.0-14.9	9				7				8			
	15.0-16.9	11	4,159.17	3,473.92	891.15	4	1,867.15	1,518.05	418.40	6	2,515.98	2,071.72	552.23
	17.0-18.9	8				2				4			
	19.0-20.9	4								1			
3	21.0-22.9					1				1			
	23.0-24.9												
	25.0-26.9						411.51	361.49	82.94		295.02	259.16	59.46
	27.0-28.9												
	29.0-30.9												
4	31.0-32.9	1	318.75	288.29	54.51					-	90.23	81.61	15.43
Total		370	4,541.25	3,809.71	1,381.20	435	2,643.46	2,133.94	782.08	417	3,180.69	2,608.32	951.68

Note: Board foot volume in trees 9.0" D.B.H. and larger.
Cubic foot volume in trees 5.0" D.B.H. and larger.

Table 24

Average Net Volume Per Acre By Species and Crown Density Classes

DOUGLAS-FIR POLETIMBER TYPE

Species	Crown Density Classes: Well and Poor (VS-04) CF	Medium (VS-05) CF	Average CF	Percent of Species
Douglas-fir	380.35	441.31	401.67	57
Ponderosa Pine	126.33	148.22	133.98	19
Lodgepole Pine	48.50	166.69	89.83	13
Limber Pine	7.91		5.14	1
Engelmann Spruce	28.49		18.54	2
Blue Spruce	88.51		57.55	8
Total	680.09	756.22	706.71	100
Area in Volume Stratum				
Acres	9,717	5,226	14,943	
Percent	65	35	100	

Table 25

Stock and Stand Table By D.B.H. and Crown Density Classes

DOUGLAS-FIR POLETIMBER TYPE

Average Per Acre

D.B.H. Classes		Crown Density Classes								
		Well and Poor (VS-04)			Medium (VS-05)			Weighted Average		
10" Class	2" Class	No. of Trees	Net Volume Cubic Ft.	Basal Area Square Ft.	No. of Trees	Net Volume Cubic Ft.	Basal Area Square Ft.	No. of Trees	Net Volume Cubic Ft.	Basal Area Square Ft.
0	1.0- 2.9	250		5.45	250		5.45	250		5.45
	3.0- 4.9	375		32.74	84		7.33	273		23.85
1	5.0- 6.9	131	197.46	25.72	142	202.99	27.87	135	199.39	26.47
	7.0- 8.9	63	263.27	21.99	83	318.05	28.98	70	282.43	24.43
	9.0-10.9	6	43.49	3.27	8	41.65	4.36	7	42.85	3.65
2	11.0-12.9	6		4.71	8		6.28	7		5.26
	13.0-14.9	6		6.41	1		1.07	4		4.54
	15.0-16.9		175.87		3	193.53	4.19	1	182.04	1.47
	17.0-18.9									
	19.0-20.9									
Total:		837	680.09	100.29	579	756.22	85.53	747	706.71	95.12
Percent		65%			35%					

Note: Volume in trees 5.0" D.B.H. and larger.

Table 26

Average Net Volume Per Acre By Species and Crown Density Classes

PONDEROSA PINE SAWTIMBER TYPE

Species	Crown Density Classes: Medium (VS-06) Int. 1/4" BF	Medium (VS-06) Scrib. Dec. C BF	Medium (VS-06) Cubic Feet	Poor (VS-07) Int. 1/4" BF	Poor (VS-07) Scrib. Dec. C BF	Poor (VS-07) Cubic Feet	Average Int. 1/4" BF	Average Scrib. Dec. C BF	Average Cubic Feet	Percent of Species Based on Int. 1/4" BF	Percent of Species Based on Scrib. Dec. C BF	Percent of Species Based on Cubic Feet
Douglas-fir	426.75	363.00	95.91	419.40	326.78	103.30	420.78	333.59	101.91	18	17	15
Ponderosa Pine	2,464.71	2,030.13	726.47	1,690.56	1,401.42	507.63	1,836.17	1,519.67	548.79	78	79	79
Lodgepole Pine	146.92	118.25	27.97	31.91	25.53	22.23	53.54	42.97	23.31	2	2	3
Limber Pine				42.25	34.66	8.23	34.30	28.14	6.68	1	1	1
Subalpine Fir				17.79	15.62	3.38	14.44	12.68	2.74	1	1	0
Aspen			62.54			2.59			13.87	-	-	2
Blue Spruce						1.67			1.35	-	-	0
Total	3,038.38	2,511.38	912.89	2,201.91	1,804.01	649.03	2,359.23	1,937.05	698.65	100	100	100
Area in Volume Stratum												
Acres		8,148			35,174			43,322				
Percent		19			81			100				

Table 27

Stock and Stand Table By D.B.H. and Crown Density Classes

PONDEROSA PINE SAWTIMBER

Average Per Acre

D. B. H. Classes		Crown Density Classes											
		Medium (VS-06)				Poor (VS-07)				Average			
			Net Volume				Net Volume				Net Volume		
10" Class	2" Class	No. of Trees	Int. ¼" BF	Scrib. Dec. C BF	Cubic Feet	No. of Trees	Int. ¼" BF	Scrib. Dec. C BF	Cubic Feet	No. of Trees	Int. ¼" BF	Scrib. Dec. C BF	Cubic Feet
0	1.0- 2.9	167				71				89			
	3.0- 4.9	333				0				63			
1	5.0- 6.9	33			64.70	21			25.31	23			32.72
	7.0- 8.9	34			110.54	17			59.16	20			68.82
1	9.0- 9.9	8	174.17	142.50	55.54	12	210.90	163.33	62.72	19	203.99	159.41	61.37
	10.0-10.9	-				10	226.51	172.80	67.24		183.91	140.30	54.59
2	11.0-12.9	16				11				12			
	13.0-14.9	9				6				7			
	15.0-16.9	7	2,604.66	2,148.49	629.57	4	1,636.85	1,354.84	404.84	5	1,818.87	1,504.11	447.11
	17.0-18.9	3				1				1			
	19.0-19.9	0				1				1			
	20.0-20.9	1				0							
3	21.0-22.9	0				0				0			
	23.0-24.9	0				0				1			
	25.0-26.9	0	259.55	220.39	52.54	0	127.65	113.04	29.76		152.46	133.23	34.04
	27.0-28.9	0											
	29.0-30.9	0											
Total		611	3,038.38	2,511.38	912.89	155	2,201.91	1,804.01	649.03	241	2,359.23	1,937.05	698.65

Note: Board foot volume in trees 9.0" D.B.H. and larger.
Cubic foot volume in trees 5.0" D.B.H. and larger.

Table 28

Average Net Volume Per Acre By Species and Crown Density Classes

PONDEROSA PINE POLETIMBER TYPE

Species	Crown Density Classes				Percent By Species
	Well (VS-08)	Medium (VS-09)	Poor (VS-10)	Average	
	CF	CF	CF	CF	
Douglas-fir	6.12	85.75	115.17	91.36	19
Ponderosa Pine	479.74	414.42	264.65	360.18	74
Lodgepole Pine	10.91	33.34	31.53	30.93	6
Blue Spruce		6.06		3.21	1
Total	496.77	539.57	411.35	485.68	100
Area in Volume Stratum					
Acres	4,470	31,336	23,384	59,190	
Percent	8	53	39	100	

Table 29

Stock and Stand Table By D.B.H. and Crown Density Classes

PONDEROSA PINE POLETIMBER TYPE

Average Per Acre

D.B.H. Classes 10" Class	D.B.H. Classes 2" Class	Crown Density Classes: Well (VS-08) No. of Trees	Well (VS-08) Net Volume Cu. Ft.	Well (VS-08) Basal Area Sq. Ft.	Medium (VS-09) No. of Trees	Medium (VS-09) Net Volume Cu. Ft.	Medium (VS-09) Basal Area Sq. Ft.	Poor (VS-10) No. of Trees	Poor (VS-10) Net Volume Cu. Ft.	Poor (VS-10) Basal Area Sq. Ft.	Weighted Average No. of Trees	Weighted Average Net Volume Cu. Ft.	Weighted Average Basal Area Sq. Ft.
0	1.0- 2.9	250		5.45	125		2.73	107		2.33	128		2.78
	3.0- 4.9	250		21.82	125		10.91	36		3.14	101		8.66
1	5.0- 6.9	100	72.16	19.63	94	114.74	18.46	37	30.27	7.26	72	78.15	14.12
	7.0- 8.9	13	22.05	4.54	44	140.25	15.36	24	85.04	8.38	34	109.51	11.79
	9.0-10.9	12	96.77	6.54	31	132.92	16.91	14	110.46	7.64	23	121.32	12.46
2	11.0-12.9	15		11.78	6		4.71	7		5.50	7		5.56
	13.0-14.9	9		9.62	3		3.21	3		3.21	3		3.69
	15.0-16.9	0	305.79		2	151.66		2	185.58		2	176.70	
	17.0-18.9	1		1.77	0			0					0.13
	19.0-20.9	0			0			0					
Total:		650	496.77	81.15	430	539.57	72.29	230	411.35	37.46	370	485.68	59.19
Percent			8%			53%			39%				

Note: Volume in trees 5.0" D.B.H. and larger.

Table 30

Average Net Volume Per Acre By Species and Crown Density Classes

LODGEPOLE PINE SAWTIMBER TYPE

Species	Crown Density Classes: Well (VS-12) Int. ¼" BF	Well (VS-12) Scrib. Dec. C BF	Well (VS-12) Cubic Feet	Medium (VS-13) Int. ¼" BF	Medium (VS-13) Scrib. Dec. C BF	Medium (VS-13) Cubic Feet	Poor (VS-14) Int. ¼" BF	Poor (VS-14) Scrib. Dec. C BF	Poor (VS-14) Cubic Feet	Average Int. ¼" BF	Average Scrib. Dec. C BF	Average Cubic Feet	Percent of Species Based On Int. ¼" BF	Scrib. Dec. C BF	Cubic Feet
Douglas-fir				69.24	54.82	23.97				33.61	26.61	11.64	-	-	1
Lodgepole Pine				10,851.82	8,577.09	2,783.92	4,999.94	3,892.29	1,669.52	7,821.89	6,151.86	2,204.19	80	78	80
Limber Pine				44.47	37.04	19.33				21.59	17.98	9.38	-	-	-
Subalpine Fir	1,007.10	762.15	249.62	204.23	162.36	87.62	836.42	647.32	315.87	530.15	412.32	204.81	5	5	7
Engelmann Spruce	10,280.88	9,418.08	1,912.11	2,108.33	1,923.94	484.33	711.50	650.05	176.07	1,425.99	1,301.81	332.32	15	17	12
Total	11,287.98	10,180.23	2,161.73	13,278.09	10,755.25	3,399.17	6,547.86	5,189.66	2,161.46	9,833.23	7,910.58	2,762.34	100	100	100

Area in Volume Stratum				
Acres	340	43,437	45,696	89,473
Percent	1	48	51	100

Table 31

Stock and Stand Table By D.B.H. and Crown Density Classes

LODGEPOLE PINE SAWTIMBER

Average Per Acre

D.B.H. Classes		Crown Density Classes															
		Well (VS-12)				Medium (VS-13)				Poor (VS-14)				Average			
			Net Volume				Net Volume				Net Volume				Net Volume		
10" Class	2" Class	No. of Trees	Int. ¼" BF	Scrib. Dec. C BF	Cubic Feet	No. of Trees	Int. ¼" BF	Scrib. Dec. C BF	Cubic Feet	No. of Trees	Int. ¼" BF	Scrib. Dec. C BF	Cubic Feet	No. of Trees	Int. ¼" BF	Scrib. Dec. C BF	Cubic Feet
0	1.0- 2.9					125				94				108			
	3.0- 4.9					35				156				96			
1	5.0- 6.9					94			201.75	128			316.17	110			259.42
	7.0- 8.9					89			577.42	72			510.46	79			541.03
1	9.0- 9.9	50	2,069.25	1,674.00	472.88	40	2,094.62	1,572.54	446.98	33	1,537.39	1,145.08	334.03	69	1,809.93	1,354.61	389.39
	10.0-10.9	-				41	2,612.44	1,956.15	551.78	26	1,386.28	1,034.63	302.23		1,976.28	1,478.07	422.23
2	11.0-12.9	10				39				20				29			
	13.0-14.9	10				18				10				14			
	15.0-16.9	8	6,009.98	5,558.85	1,125.58	6	8,379.29	7,049.33	1,586.78	5	3,624.19	3,009.95	698.57	6	5,941.74	4,980.66	1,131.40
	17.0-18.9	5				4				1				2			
	19.0-20.9	2				2								1			
3	21.0-22.9	5	3,208.75	2,947.38	563.27		191.74	177.23	34.46					1	105.28	97.24	18.87
	23.0-24.9	3												0			
Total:		93	11,287.98	10,180.23	2,161.73	493	13,278.09	10,755.25	3,399.17	545	6,547.86	5,189.66	2,161.46	515	9,833.23	7,910.58	2,762.34

Note: Board foot volume in trees 9.0" D.B.H. and larger.
Cubic foot volume in trees 5.0: D.B.H. and larger.

Table 32

Average Net Volume Per Acre By Species and Crown Density Classes

LODGEPOLE PINE POLETIMBER TYPE

Species	Crown Density Classes				Percent of Species
	Well (VS-15)	Medium (VS-16)	Poor (VS-17)	Average	
	CF	CF	CF	CF	
Douglas-fir	9.40	46.55		23.19	2
Ponderosa Pine	2.71	4.80		3.38	0
Lodgepole Pine	1,025.32	1,193.10	806.74	1,079.28	91
Limber Pine		6.69	18.08	3.42	0
Subalpine Fir	57.42	31.92		44.94	4
Engelmann Spruce	6.62	55.33		24.97	2
Aspen		33.44		12.81	1
Total	1,101.47	1,371.83	824.82	1,191.99	100
Area in Volume Stratum					
Acres	123,701	83,213	10,262	217,176	
Percent	57	38	5	100	

Table 33

Stock and Stand Table By D.B.H. and Crown Density Classes

LODGEPOLE PINE POLETIMBER TYPE

Average Per Acre

D.B.H. Classes 10" Class	D.B.H. Classes 2" Class	Crown Density Classes: Well (VS-15) No. of Trees	Well (VS-15) Net Volume Cu. Ft.	Well (VS-15) Basal Area Sq. Ft.	Medium (VS-16) No. of Trees	Medium (VS-16) Net Volume Cu. Ft.	Medium (VS-16) Basal Area Sq. Ft.	Poor (VS-17) No. of Trees	Poor (VS-17) Net Volume Cu. Ft.	Poor (VS-17) Basal Area Sq. Ft.	Weighted Average No. of Trees	Weighted Average Net Volume Cu. Ft.	Weighted Average Basal Area Sq. Ft.
0	1.0- 2.9	717		15.64	250		5.45	188		4.10	513		11.19
	3.0- 4.9	400		34.91	310		27.05	187		16.32	355		30.99
1	5.0- 6.9	178	351.13	34.95	190	415.75	37.31	156	311.61	30.63	181	374.02	35.63
	7.0- 8.9	72	477.74	25.13	90	525.51	31.42	57	315.86	19.90	78	488.40	27.26
	9.0-10.9	20	200.95	1.09	25	251.76	1.36	18	145.50	0.98	22	217.80	1.19
2	11.0-12.9	2		1.57	7		5.50	2		1.57	4		3.06
	13.0-14.9	1		1.07	1		1.07	1		1.07	1		1.07
	15.0-16.9		62.25		2	174.30	2.79	1	51.85	1.40	1	104.69	1.13
	17.0-18.9												
	19.0-20.9												
3	21.0-22.9		9.40			4.51						7.08	
Total:		1,390	1,101.47	114.36	875	1,371.83	111.95	610	824.82	75.97	1,155	1,191.99	111.52
Percent			57%			38%			5%				

Note: Volume in trees 5.0" D.B.H. and larger.

Table 34

Average Net Volume Per Acre By Species and Crown Density Classes

SPRUCE-FIR SAWTIMBER TYPE

Species	Crown Density Classes: Large Sawtimber: Medium (VS-31) Int. ¼" BF	Large Sawtimber: Medium (VS-31) Scrib. Dec. C BF	Large Sawtimber: Medium (VS-31) Cubic Feet	Small Sawtimber: Well (VS-22) Int. ¼" BF	Small Sawtimber: Well (VS-22) Scrib. Dec. C. BF	Small Sawtimber: Well (VS-22) Cubic Feet	Small Sawtimber: Medium (VS-23) Int. ¼" BF	Small Sawtimber: Medium (VS-23) Scrib. Dec.C BF	Small Sawtimber: Medium (VS-23) Cubic Feet	Small Sawtimber: Poor (VS-24) Int. ¼" BF	Small Sawtimber: Poor (VS-24) Scrib. Dec.C BF	Small Sawtimber: Poor (VS-24) Cubic Feet	Small Sawtimber: Average Int. ¼" BF	Small Sawtimber: Average Scrib. Dec. C BF	Small Sawtimber: Average Cubic Feet	Percent of Species Based on: Int. ¼" BF	Scrib: Dec.C BF	Cubic Feet
Douglas-fir				874.69	724.50	177.65							29.64	24.53	6.02	0	0	0
Lodgepole Pine				1,057.01	888.83	199.82	1,623.45	1,311.51	372.68	1,766.94	1,440.86	373.14	1,627.14	1,318.85	364.40	12	11	12
Subalpine Fir	2,249.09	1,939.07	484.19	1,224.30	1,000.13	417.34	2,772.51	2,246.27	853.05	1,836.81	1,432.61	591.35	2,495.36	2,009.67	773.93	17	16	24
Engelmann Spruce	37,679.67	34,558.47	6,201.38	15,164.34	13,864.65	2,890.75	11,587.65	10,616.40	2,306.51	4,173.71	3,808.75	935.30	10,134.40	9,280.68	2,028.78	71	73	64
Total	39,928.76	36,497.54	6,685.57	18,320.34	16,478.11	3,685.56	15,983.61	14,174.18	3,532.24	7,777.46	6,682.22	1,899.79	14,286.54	12,633.73	3,173.13	100	100	100

Area in Volume Stratum					
Acres	430	2,145	45,771	14,962	63,308
Percent	1	3	72	24	100

Table 35

Stock and Stand Table By D.B.H. and Crown Density Classes

SPRUCE-FIR SAWTIMBER TYPE

Average Per Acre

D.B.H. Classes		Crown Density Classes: Large Sawtimber — Well and Medium (VS-31)				Small Sawtimber — Well (VS-22)				Small Sawtimber — Medium (VS-23)				Small Sawtimber — Poor (VS-24)				Small Sawtimber — Weighted Average			
			Net Volume				Net Volume				Net Volume				Net Volume				Net Volume		
10" Class	2" Class	No. of Trees	Int. ¼" BF	Scrib. Dec. C BF	Cubic Feet	No. of Trees	Int. ¼" BF	Scrib. Dec. C BF	Cubic Feet	No. of Trees	Int. ¼" BF	Scrib. Dec.C BF	Cubic Feet	No. of Trees	Int. ¼" BF	Scrib. Dec. C BF	Cubic Feet	No. of Trees	Int. ¼" BF	Scrib. Dec. C BF	Cubic Feet
0	1.0- 2.9	100				62				147				166				148			
	3.0- 4.9	0				0				118				0				85			
1	5.0- 6.9	5			35.15	44			74.58	66			136.94	53			88.92	61			122.79
	7.0- 8.9	5				31			199.45	52			340.94	47			258.38	50			314.32
1	9.0- 9.9	0				13	255.75	209.25	54.57	53	1,173.44	912.21	255.18	39	576.07	428.84	132.58	49	993.19	767.96	217.67
	10.0-10.9	0					279.00	232.50	58.81		1,747.86	1,425.10	369.45		1,335.58	1,048.83	290.74		1,588.76	1,286.07	337.81
2	11.0-12.9	8				27				27				18				25			
	13.0-14.9	11				21				17				12				16			
	15.0-16.9	11	14,008.20	13,003.78	2,495.05	17	11,948.82	10,747.49	2,296.91	11	10,195.56	9,204.71	1,932.79	6	5,472.26	4,850.96	1,059.05	10	9,164.81	8,254.05	1,742.49
	17.0-18.9	18				16				8				6				8			
	19.0-20.9	9				6				3				2				3			
3	21.0-22.9	9				6				3				0				2			
	23.0-24.9	7				1				1				1				1			
	25.0-26.9	3	17,668.01	16,098.29	2,848.70	0	5,836.77	5,288.87	1,001.24	1	2,866.75	2,632.16	496.94	0	393.55	353.59	70.12	1	2,483.66	2,275.36	429.17
	27.0-28.9	4				2				0				0				0			
	29.0-30.9	3				2				0				0				0			
4	31.9-32.9	1																0			
	33.0-34.9	3																0			
	35.0-36.9	0	7,130.68	6,389.31	1,132.49													0	48.49	43.45	7.70
	37.0-38.9	1																0			
	39.0-40.9	0																0			
5	41.0+	1	1,121.87	1,006.16	174.18													0	7.63	6.84	1.18
Total:		199	39,928.76	36,497.54	6,685.57	248	18,320.34	16,478.11	3,685.56	507	15,983.61	14,174.18	3,532.24	350	7,777.46	6,682.22	1,899.79	459	14,286.54	12,633.73	3,173.13

Note: Board foot volume in trees 9.0" D.B.H. and larger.
Cubic foot volume in trees 5.0" D.B.H. and larger.

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Table 36

Average Net Volume Per Acre By Species and Crown Density Classes

SPRUCE-FIR POLETIMBER TYPE

Species	Crown Density Classes			Percent of Species
	Well (VS-25)	Poor (VS-26)	Average	
	CF	CF	CF	
Douglas-fir				
Ponderosa Pine				
Lodgepole Pine	529.39	49.69	117.02	9
Limber Pine	1,013.34		142.23	10
Subalpine Fir	29.44	575.67	499.00	36
Engelmann Spruce	236.21	671.81	610.67	45
Aspen				
Total	1,808.38	1,297.17	1,368.92	100
Area in Volume Stratum				
Acres	1,575	9,646	11,221	
Percent	14	86	100	

Table 37

Stock and Stand Table By D.B.H. and Crown Density Classes

SPRUCE-FIR POLETIMBER TYPE

Average Per Acre

D.B.H. Classes		Crown Density Classes								
		Well (VS-25)			Poor (VS-26)			Weighted Average		
10" Class	2" Class	No. of Trees	Net Volume Cubic Ft.	Basal Area Square Ft.	No.of Trees	Net Volume Cubic Ft.	Basal Area Square Ft.	No.of Trees	Net Volume Cubic Ft.	Basal Area Square Ft.
0	1.0- 2.9	750		16.35				105		2.29
	3.0- 4.9	250		21.83				35		3.07
1	5.0- 6.9	25	48.50	4.91	175	290.99	34.35	154	256.96	30.22
	7.0- 8.9	100	582.01	34.91	113	480.15	39.45	111	494.45	38.81
	9.0-10.9	75	623.22	40.91	37	278.88	20.18	42	327.21	23.09
2	11.0-12.9	13		10.21	8		6.28	8		6.83
	13.0-14.9	7		7.48	3	247.14	3.21	4	212.45	3.81
	15.0-16.9	8	554.65	11.17	3		4.19	4	77.85	5.17
	17.0-18.9	2		3.53				1		0.50
	19.0-20.9									
Total:		1,230	1,808.38	151.30	339	1,297.16	107.66	463	1,368.92	113.79
Percent		14%			86%					

Note: Volume in trees 5.0" D.B.H. and larger.

Table 38

Area, Volume Per Acre, and Total Volume By Volume Stratum
For Unreserved National Forest Lands

Volume Stratum						Volume Per Acre			Total Volume		
No.	Type	Stand Size Class	Stocking Class	No. of Locations	Area Acres	Int. ¼" BF	Scrib. Dec. C BF	Cubic Feet CF	Int. ¼" MBF	Scrib. Dec. C MBF	Cubic Feet MCF
1	Douglas-fir	LST	Poor	1	120	940.78	809.90	350.28	113	97	42
2	Douglas-fir	SST	W&M	3	2,058	4,541.25	3,809.71	1,381.20	9,346	7,840	2,843
3	Douglas-fir	SST	Poor	5	5,092	2,643.46	2,133.94	782.08	13,460	10,866	3,982
6	Ponderosa Pine	SST	Med.	3	8,148	3,038.38	2,511.38	912.89	24,757	20,463	7,438
7	Ponderosa Pine	SST	Poor	32	35,174	2,201.91	1,804.01	649.03	77,450	63,454	22,829
12	Lodgepole Pine	SST	Well	1	340	11,287.98	10,180.23	2,161.73	3,838	3,461	735
13	Lodgepole Pine	SST	Med.	22	43,437	13,278.09	10,755.25	3,399.17	576,760	467,176	147,650
14	Lodgepole Pine	SST	Poor	8	45,696	6,547.86	5,189.66	2,161.46	299,211	237,147	98,770
30	Limber Pine, etc	SST	Med.	0	1,045	SU-25, VS-10			3,716	3,102	687
31	Spruce-Fir	LST	W&M	0	430	SU-25, VS-18			17,174	15,741	3,167
22	Spruce-Fir	SST	Well	4	2,145	18,320.34	16,478.11	3,685.56	39,297	35,346	7,906
23	Spruce-Fir	SST	Med.	17	45,771	15,983.61	14,174.18	3,532.24	731,586	648,766	161,674
24	Spruce-Fir	SST	Poor	9	14,962	7,777.46	6,682.22	1,899.79	116,366	99,979	28,425
Sub-Total Sawtimber				105	204,418	9,358.64	7,892.84	2,378.20	1,913,074	1,613,438	486,148
4	Douglas-fir	PT	W&P	4	9,717			680.09			6,608
5	Douglas-fir	PT	Med.	3	5,226			756.22			3,952
8	Ponderosa Pine	PT	Well	2	4,470			496.77			2,221
9	Ponderosa Pine	PT	Med.	4	31,336			539.57			16,908
10	Ponderosa Pine	PT	Poor	14	23,384			411.35			9,619
15	Lodgepole Pine	PT	Well	15	123,701			1,101.47			136,253
16	Lodgepole Pine	PT	Med.	25	83,213			1,371.83			114,154
17	Lodgepole Pine	PT	Poor	4	10,262			824.82			8,464
21	Limber Pine, etc	PT	W,M,P	1	6,510			50.92			331
25	Spruce-Fir	PT	Well	1	1,575			1,808.38			2,848
26	Spruce-Fir	PT	M&P	2	9,646			1,297.17			12,512
Sub-Total Poletimber				75	309,040			1,015.63			313,870

(Table Continued)

Table 38 (Continued)

Area, Volume Per Acre, and Total Volume By Volume Stratum
For Unreserved National Forest Lands

Volume Stratum						Volume Per Acre			Total Volume		
No.	Type	Stand Size Class	Stocking Class	No. of Locations	Area Acres	Int. 1/4" BF	Scrib. Dec. C BF	Cubic Feet CF	Int. 1/4" MBF	Scrib. Dec. C MBF	Cubic Feet MCF
-	Douglas-fir	SS	Well	0	45			VS-19			2
19	Ponderosa Pine	SS	Poor	2	90			52.14			5
18	Lodgepole Pine	SS	Well	4	5,224			539.81			2,820
-	Lodgepole Pine	SS	Med.	2	3,031			VS-19			158
20	Lodgepole Pine	SS	Poor	2	881			161.26			142
-	Limber Pine, etc.	SS	M&P	0	410			VS-19			21
-	Spruce-Fir	SS	M&P	0	90			VS-19			5
Sub-Total Seedling-Sapling				10	9,771			322.69			3,153
-	Douglas-fir	NS		0	110			VS-11			2
11	Ponderosa Pine	NS		3	1,398			16.07			22
29	Lodgepole Pine	NS		0	682		SU-25,	VS-9			10
32	Spruce-Fir	NS		0	458		SU-25,	VS-17			68
Sub-Total Nonstocked				3	2,648			38.52			102
Total Coniferous Types				193	525,877	3,637.87	3,068.09	1,527.49	1,913,074	1,613,438	803,273
27	Aspen	PT	M&P	2	8,732			642.17			5,607
28	Aspen	SS	Well	1	1,785			0			-
33	Cottonwood	NS		0	0			0			-
Total Hardwood Types				3	10,517			533.14			5,607
Grand Total				196	536,394	3,566.55	3,007.93	1,508.00	1,913,074	1,613,438	808,880

Note: Board foot volume in trees 9.0" D.B.H. and larger.
Cubic foot volume in trees 5.0" D.B.H. and larger.

Table 39

Area, Volume Per Acre and Total Volume By Volume Stratum and Ownership

Volume Stratum				Volume per Acre			State and County Lands				Private Lands			
								Total Volume				Total Volume		
No.	Type	Stand Size Class	Stocking Class	Int. ¼" BF	Scrib. Dec. C BF	Cubic CF	Area Acres	Int. ¼" MBF	Scrib. Dec. C MBF	Cubic MCF	Area Acres	Int. ¼" MBF	Scrib. Dec. C MBF	Cubic MCF
1	Douglas-fir	LST	Poor	940.78	809.90	350.28	0				50	47	40	18
2	Douglas-fir	SST	W&M	4,541.25	3,809.71	1,381.20	20	91	76	28	588	2,670	2,240	812
3	Douglas-fir	SST	Poor	2,643.46	2,133.94	782.08	125	330	267	98	1,655	4,375	3,532	1,294
6	Ponderosa Pine	SST	Med.	3,038.38	2,511.38	912.89	15	46	38	14	4,562	13,861	11,457	4,165
7	Ponderosa Pine	SST	Poor	2,201.91	1,804.01	649.03	1,129	2,485	2,037	733	23,953	52,742	43,211	15,546
13	Lodgepole Pine	SST	Med.	13,278.09	10,755.25	3,399.17	165	2,191	1,775	561	3,308	43,924	35,578	11,244
14	Lodgepole Pine	SST	Poor	6,547.86	5,189.66	2,161.46	675	4,420	3,503	1,459	7,635	49,993	39,623	16,503
30	Limber Pine,etc	SST	Med.	3,555.55	2,968.15	657.64	70	249	208	46	45	160	134	30
31	Spruce-Fir	LST	Med.	39,928.76	36,497.54	6,685.57	40	1,597	1,460	267	0			
23	Spruce-Fir	SST	Med.	15,983.61	14,174.18	3,532.24	680	10,869	9,638	2,402	1,363	21,786	19,319	4,814
24	Spruce-Fir	SST	Poor	7,777.46	6,682.22	1,899.79	630	4,900	4,210	1,197	2,707	21,054	18,089	5,143
Sub-Total Sawtimber							3,549	27,178	23,212	6,805	45,866	210,612	173,223	59,569
4	Douglas-fir	PT	W&P			680.09	75			51	4,899			3,332
5	Douglas-fir	PT	Med.			756.22	45			34	2,590			1,959
8	Ponderosa Pine	PT	Well			496.77	20			10	2,877			1,429
9	Ponderosa Pine	PT	Med.			539.57	285			154	28,823			15,552
10	Ponderosa Pine	PT	Poor			411.35	714			294	20,072			8,257
15	Lodgepole Pine	PT	Well			1,101.47	1,385			1,526	26,026			28,667
16	Lodgepole Pine	PT	Med.			1,371.83	555			761	20,287			27,830
17	Lodgepole Pine	PT	Poor			824.82	55			45	3,593			2,964
21	Limber Pine,etc	PT	W,M,P			50.92	265			13	1,435			73
25	Spruce-Fir	PT	Well			1,808.38	20			36	175			316
26	Spruce-Fir	PT	M&P			1,297.17	502			651	1,287			1,669
Sub-Total Poletimber							3,921			3,575	112,064			92,048

(Table Continued)

Table 39 (Continued)

Area, Volume Per Acre and Total Volume By Volume Stratum and Ownership

Volume Stratum			Volume per Acre			State and County Lands				Private Lands			
							Total Volume				Total Volume		
No.	Type	Stand Size Class	Stocking Class	Int. ¼" BF	Scrib. Dec. C BF	Cubic CF	Area Acres	Int. ¼" MBF	Scrib. Dec. C MBF	Cubic MCF	Area Acres	Int. ¼" MBF	Scrib. Dec. C MBF	Cubic MCF
19	Ponderosa Pine	SS	Poor			52.14	225			12	985			51
18	Lodgepole Pine	SS	Well			539.81	45			24	669			361
20	Lodgepole Pine	SS	Poor			161.26	0				244			39
Sub-Total Seedling-Sapling							270			36	1,898			451
	Douglas-fir	NS									10	Use	VS-11	0
11	Ponderosa Pine	NS				16.07	50			1	1,293			21
29	Lodgepole Pine	NS				15.44	5			0	380			6
32	Spruce-Fir	NS				149.22	43			6	30			4
Sub-Total Nonstocked							98			7	1,713			31
Total Coniferous Types							7,838			10,300	161,541			152,099
27	Aspen	PT	M&P			642.17	385			247	2,691			1,728
28	Aspen	SS	Well			0	30			0	370			0
33	Cottonwood	NS				0	0			0	20			0
Total Hardwood Types							415			247	3,081			1,728
Grand Total							8,253			10,547	164,622			153,827

Note: Board foot volume in trees 9.0" D.B.H. and larger.
Cubic foot volume in trees 5.0" D.B.H. and larger.

Roosevelt Working Circle Compartments

1 - Laramie River Block

001 Johnson Creek
002 Stuck Creek
003 Grace Creek
004 LaGarde
005 McIntyre Creek
006 Rawah Creek
007 West Branch
008 Twin Lake
009 Fall
010 Sawmill
011 Joe Wright
012 Trap
013 Long Draw
014 Corral
015 Big South
016 Chambers Lake
017 Nunn Creek
018 Deadman

2 - Redfeather Block

019 Green Mountain
020 Baton
021 Osborn
022 Sand Creek
023 Upper Panhandle
024 Panhandle
025 South Panhandle
026 Pearl
027 Lookout
028 Portner
029 East Bald Mountain
030 Divide
031 Bald Mountain
032 Roaring
033 Tunnel
034 Peterson
035 Glen Echo
036 Sevenmile
037 Upper Elkhorn
038 Upper Lone Pine
039 Columbine
040 Black Mountain
041 George
042 North Poudre
043 McGrevy
044 Boulder Ridge
045 Trail
046 Cherokee Park
047 Mill Creek
048 Prairie Divide
049 Lost Lake
050 Rabbit
051 Dowdy Lake
052 Lone Pine
053 Manhattan
054 Elkhorn
055 Gordon
056 Lower Elkhorn
057 Hewlett
058 Greyrock
059 Reservoir

3 - Poudre Block

060 Sleeping Elephant
061 May
062 Grass Lake
063 Willow
064 Big Beaver
065 Black Hollow
066 Rustic
067 Bennett
068 Little Beaver
069 Fish Creek
070 South Fork
071 Pennock
072 Monument
073 White Rock
074 Pendergrass
075 Poverty Flats
076 Skin
077 Stove Prairie
078 Box Prairie
079 Hell Hollow
080 Twin Cabin
081 Paradise Park
082 Elk
083 Ballard
084 Cascade
085 Crystal
086 Sheep
087 North Fish
088 South Fish
089 Stringtown
090 Bear
091 Happy Hollow
092 Redstone
093 Capehorn
094 Youngs
095 Hills
096 Yaugers
097 Groves
098 Lewstone
099 Log Canyon
100 Rist
101 Longs
102 Mill Canon
103 Soldier Canyon
104 Dixon
105 Horsetooth

4 - Estes Block

106 Big Thompson
107 Little Thompson
108 North St. Vrain

5 - Boulder Block

109 Middle St. Vrain
110 Main Boulder
111 South Boulder

ROOSEVELT
NATIONAL FOREST
COLORADO
SIXTH PRINCIPAL MERIDIAN

1955

Scale: 1 IN 0 1 2 3 4 5 Miles

LEGEND

- National Forest boundary
- Adjacent National Forest boundary
- Highway, hard surface
- Good motor road, graded gravel
- Motorway, improved dirt
- Poor motorway, unimproved dirt.
- Trail
- Railroad
- Telephone line
- Power line
- Fire tool cache
- Supervisor's Headquarters } Report fires here
- District ranger station
- Guard or ranger station (not permanently occupied)
- House, cabin or other building
- Improved forest camp
- Improved picnic ground
- Permanent lookout station
- Triangulation station
- Municipal and other airports
- Wild area (less than 100,000 acres)
- Natural Area
- Schoolhouse

COMPARTMENT MAP OF THE ROOSEVELT WORKING CIRCLE

LEGEND

Block Boundary
Compartment Bndry.

COMPARTMENTS IN WHICH CUTTING WILL BE DONE IN PERIOD FY 1962 TO 1971

ROADS TO BE CONSTRUCTED FY 1962 TO 1971

NOTE: Block and District names and boundaries are identical.

LARAMIE RIVER BLOCK
REDFEATHER BLOCK
POUDRE BLOCK
ESTES BLOCK
BOULDER BLOCK

MEDICINE BOW NATIONAL FOREST
ROUTT N F
ARAPAHO NATIONAL FOREST
ROCKY MOUNTAIN NATIONAL PARK
ARAPAHO NATIONAL FOREST
FRASER EXPERIMENTAL FOREST
WYOMING
COLORADO
BOUNDARY LINE
STATE FISH HATCHERY
WILD AREA
STATE FISH RETAINING PONDS
FOREST HIGHWAY
FOREST BOUNDARY
RANGER STATION
CAMP GR
PICNIC GR
LOOKOUT
RESERVOIR
TO LARAMIE
TO CHEYENNE
TO GREELEY
TO HOT SULPHUR SPRINGS
TO FORT LUPTON
TO JCT. U.S. 85 AND AULT
TO JCT. U.S. 40 AND STEAMBOAT SPRS.
TO JCT. U.S. 40 AND GRANBY
TO GEORGETOWN
TO ECHO LAKE AND MT. EVANS
TO BERGEN PARK AND DENVER
TO MORRISON
TO FORT LOGAN AND MORRISON
TO CASTLE ROCK
TO GREELEY AND FORT MORGAN
TO LIMON AND KANSAS CITY

R.80W. R.79W. R.78W. R.77W. R.76W. R.75W. R.74W. R.73W. R.72W. R.71W. R.70W. R.69W. R.68W.

T.12N. T.11N. T.10N. T.9N. T.8N. T.7N. T.6N. T.5N. T.4N. T.3N. T.2N. T.1N. T.1S. T.2S. T.3S.

41° 00' 40° 30' 20' 10' 50'

Longitude west from Greenwich: 106° 00' 50' 40' 105° 30' 20' 10' 105° 00'

Polyconic projection North American datum